

# Service/Technical Manual

## Diagraph PA/4000 Label Printer/Applicator

5802-929  
Revision A



# Diagraph PA/4000 OPERATIONS MANUAL

**5802-928**  
**Revision F**



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## **PA/4000 OPERATIONS MANUAL TABLE OF CONTENTS**

### **Section 1.0 Introduction to the PA/4000 Printer/Applicator Series 1-1**

- 1.1 Specifications 1-1
- 1.2 Description of the Printer/Applicators in the Series 1-1

### **Section 2.0 Component Features and Specifications 2-1**

- 2.1 Floor Stand Assembly 2-1
- 2.2 The Main Unit 2-5
- 2.3 Air Cylinder/Tamp Head Assembly 2-6
- 2.4 Air Filter 2-7
- 2.5 Photosensor Assembly
- 2.6 Hand-Held Terminal
- 2.7 Optional Components
- 2.8 Replaceable Components

### **Section 3.0 Packaging 3-1**

- 3.1 Containers 3-1

### **Section 4.0 Installation 4-1**

- 4.1 Overview 4-1
- 4.2 Assembling the Stand 4-1
- 4.3 Mounting the Main Unit to the Stand 4-4
- 4.4 Mounting Attachments to the Main Unit
- 4.5 Mounting the Hand-Held Terminal and Holster
- 4.6 Mounting the Air Filter Assembly to the Stand
- 4.8 Mounting the Optional Warning Tower to the Stand 4-6
- 4.9 Mounting the Photosensor 4-6
- 4.10 Mounting the Optional Secondary Wipe-Down 4-7
- 4.11 Electrical Connections 4.8
- 4.12 DIP Switch Settings
- 4.15 Loading the Label Roll 4-14
- 4.16 Loading the Ribbon Roll 4-15
- 4.17 Testing the PA/4000 4-14
- 4.18 Setting the Baud Rate and Word Length
- 4.19 Minimum and Maximum Distances for the PA/4000
- 4.20 Final Positioning 4-17
- 4.21 Secondary Wipe-Down Assembly 4-20

### **Section 5.0 Configuration**

- 5.1 Hand-Held Terminal Configuration 5-1
- 5.2 PA/4000 Remote IO Configuration 5-2

**Section 6.0 Operations**

- 6.1 Start of the Day 6-1
- 6.2 Adjustments during Operation 6-1
- 6.3 Stopping Label Application 6-1
- 6.4 End of Day 6-2

**Section 7.0 Prodigy Plus™ Fonts and Bar Codes**

- 7.1 Available Fonts and Bar Codes
- 7.2 Internal Font Examples
- 7.3 Bar Code Examples

**Section 8.0 Printing Labels**

- 8.1 Prodigy Plus™ Print Engine Description 8-1
- 8.2 Media Supplies
- 8.3 Sample Label Printout
- 8.4 Start-up and Shut down Procedures 8-1
- 8.5 Printing Labels with Performance Series 8-1

**Section 9.0 Maintenance**

- 9.1 Daily Maintenance 8-1
- 9.2 Weekly Maintenance 8-1
- 9.3 Monthly Maintenance 8-1
- 9.4 Six Month Maintenance 8-2
- 9.5 Intermittent Maintenance 8-2
- 9.6 Yearly Maintenance

**Section 10.0 Troubleshooting**

- 10.1 Diagnostics 9-1
- 10.2 Power Problems 9-2
- 10.3 Printing Problems 9-3
- 10.4 Tamping Problems 9-6
- 10.5 Error & Warning Messages 9-16

**Section 11.0 Service Parts and Kits**

**Appendix A**

**Appendix B Cable and Pin Connections**

**Glossary**

**Index**



## 1.0 INTRODUCTION TO THE PA/4000 PRINTER/APPLICATOR SERIES

PA/4000 Series is comprised of three Printer/ Applicators each designed with special features for different uses. PA/4000 Series are print and apply systems designed for high-speed, high-volume industrial applications. They are next-label-out systems that provide true on-demand, variable data labeling. High quality print ensures excellent legibility of critical information at every phase of the shipping process.

Each system in the series comes equipped with:

- An air cylinder tamp head assembly with auto-retract that apply labels with great accuracy at high conveyor speeds
- A Prodigy Plus™ print engine manufactured by DataMax
- A hand-held terminal device that allows for control of applicator functions
- An air filter assembly

The PA/4000 connects to almost any computer through either the RS-232C or the RS-422 serial interface. If your PC uses an interface other than ASCII character based RS-232 or RS-422 you will need an interface converter. The manufacturer of your computer will be able to recommend the proper protocol and interface converter between the system and the Prodigy Plus's asynchronous RS-232C interface.

An optional software package recommended by Diagraph, called *Performance Series for Windows™*, is available for creating, storing, and printing label formats from IBM® or compatible - personal computers.

The PA/4000 has a full-range of options available. It is flexible and can address a variety of design and custom application requirements:

1. Product labeling using labels as large as 4.5 inches x 13 inches
2. Colored ribbons are available
3. Pharmaceutical and electronics packaging
4. Popular UPC bar codes
5. High-quality fonts and graphics

## 1.1 Specifications

<b>Input Devices</b>	Hand-Held Terminal and PC
<b>Communications</b>	Serial, RS-232 or RS-422 (300 to 19,200 Baud)
<b>Software (recommended)</b>	Diagraph's <i>Performance Series for Windows™</i>
<b>Applicator</b>	Tamp with auto-retract available in 6" 12" and 18" cylinder lengths
<b>Air</b>	20-60 PSI minimum, 3 cfm
<b>Electrical</b>	100-140 VAC, 60 Hz, 5 A; 200-240 VAC, 50 Hz, 5 A.
<b>Dimensions</b>	38" W X 25" H x 25" D without stand
<b>Weight</b>	150 lbs. (includes print engine) without applicator assembly or stand
<b>Environmental Requirements</b>	41° F-100°F; 20-85% RH non-condensing

## 1.2 Description of the Printer/Applicators in the Series

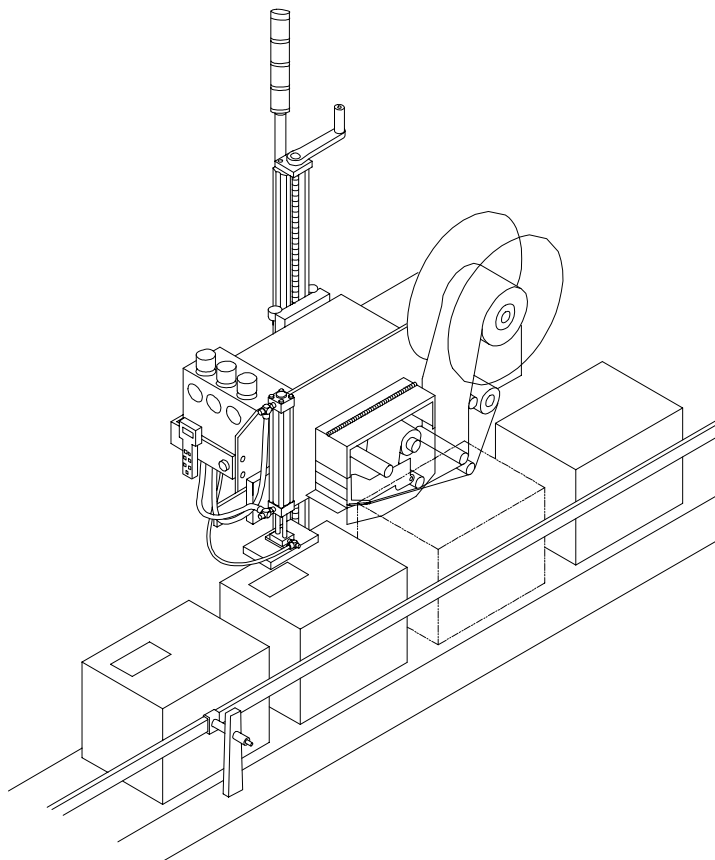
The Diagraph PA/4000 Printer/ Applicator Series is comprised of three printer applicators with features that match various labeling application needs:

- PA/4010
- PA/4015
- PA/4020

A description of the three PA/4000 systems and their features follows.

### **PA/4010 Printer/Applicator**

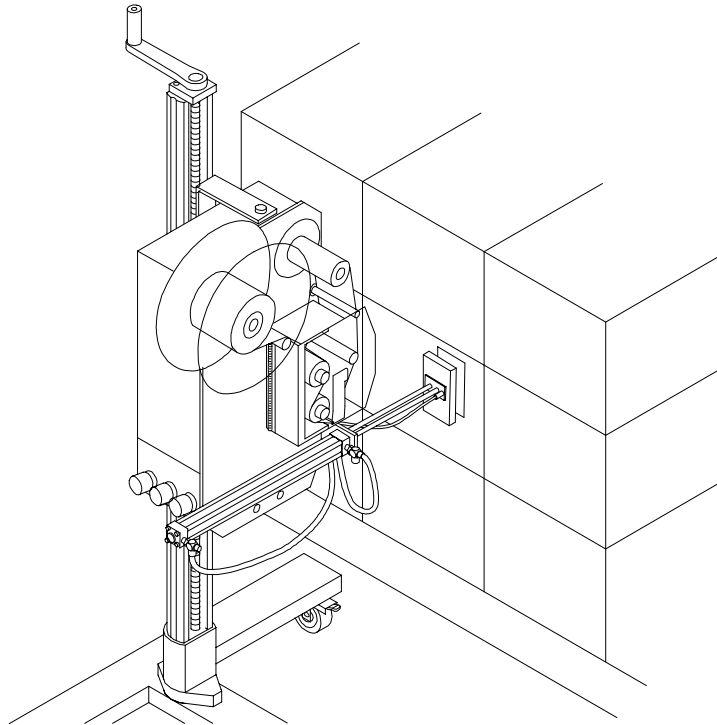
The PA/4010 Printer/ Applicator is ideal for high-speed lines running many products per minute (actual number of products per minute depends on several factors including label size).



### **PA/4015 Pallet Printer/Applicator**

The PA/4015 Pallet Printer/Applicator is ideal for pallet applications where distance from the applicator to the pallet varies. This pallet labeling system accommodates long distances between the applicator and the pallet with the extended-length cylinder option. The applicator can be configured in either horizontal or vertical orientations.

This unit handles label sizes from 4 x 4 inches to 4.5 x 12 inches.

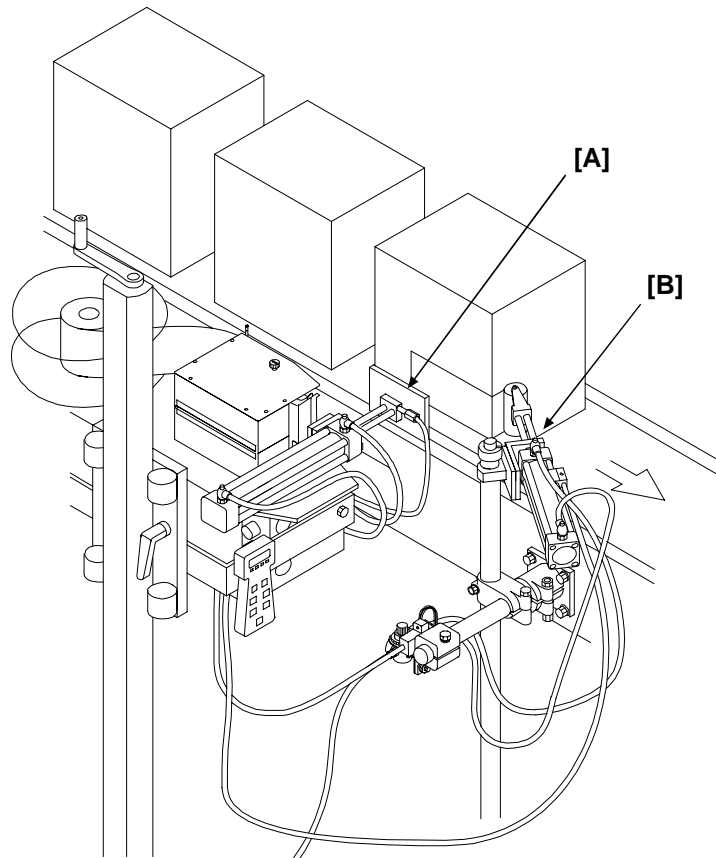


### PA/4020 Dual-Panel Printer/Applicator

The PA/4020 Dual-Panel Printer/Applicator combines a tamp applicator with a secondary wipe-down mechanism. This mechanism applies a wrap-around label up to 13 inches long to two adjacent sides of the carton for side/front or side/back labeling. This unit is functional from either side of the conveyor.

The unique dual-vacuum and slotted-vacuum design delivers a high degree of label control.

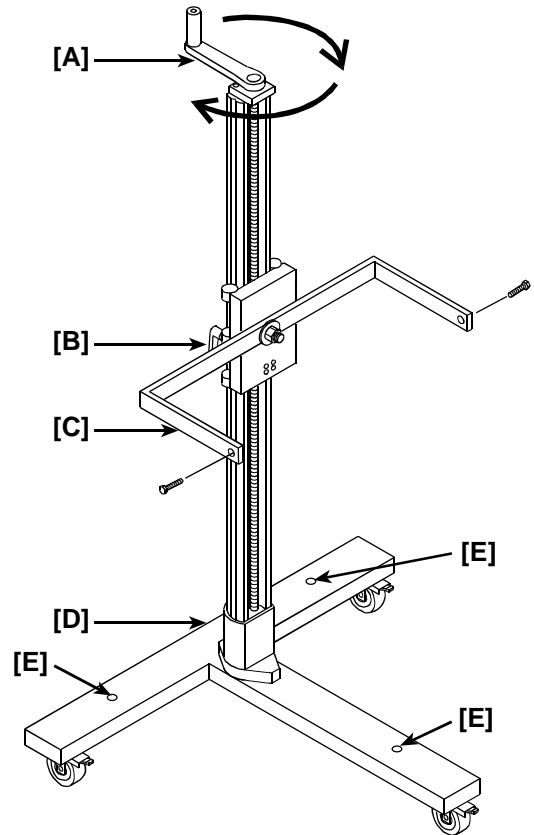
The reliable twin-rod air cylinder **[A]** tamps the first half of the label onto the carton as the secondary wipe-down roller **[B]** wraps the label around the corner and onto the adjacent side of the carton.



## 2.0 COMPONENT FEATURES AND SPECIFICATIONS

### 2.1 Floor Stand Assembly

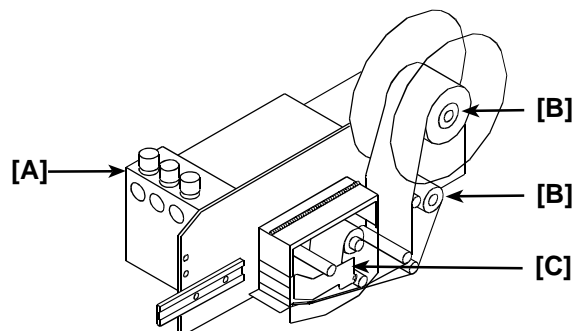
This assembly includes a tee base with casters **[D]**; an upright post with a height-adjustable mounting plate **[B]**; a yoke **[C]**; and a crank handle for adjusting the height **[A]**. The stand can be bolted to the floor for stability. The bolting holes are located on the t-base **[E]**.



### 2.2 The Main Unit

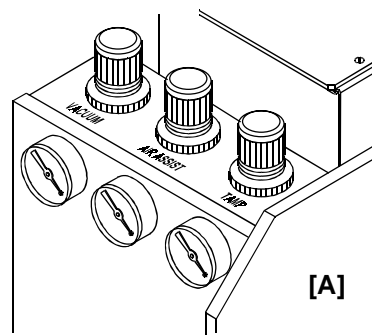
The PA/4000 main unit is a robust, yoke-mounted design of aluminum and steel. It swivels to conform to common application orientations – top down, side panel and bottom up – and then locks in place. It accommodates different sizes of tamp cylinders for variable distance and variable label size applications. It provides easy access to configuration controls – switches, air control, print engine and sensor adjustments. This unit connects to almost any computer through either the RS-232C or the RS-422 serial interface. It has three main components:

- The air control unit **[A]**
- label supply and rewind hubs **[B]**
- Prodigy Plus™ print engine **[C]**.



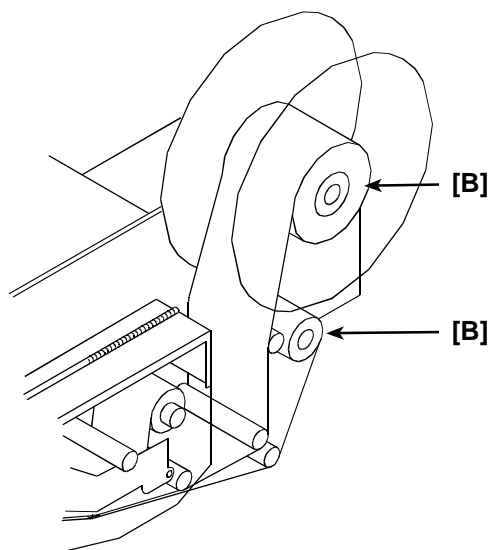
### The Air Control Unit [A]

The air control unit regulates the vacuum, air assist and tamp pressure. The vacuum holds the label against the tamp pad prior to application. The air assist guides the label (as it comes off the peel blade) on to the tamp pad. The tamp pressure controls how much air goes into the cylinder (between 20-40 psi is the usual range).



### Label Supply and Rewind Hubs [B]

The Label Supply Hub holds the roll of labels in place while the Label Rewind Hub collects the label backing material once the label is peeled off.

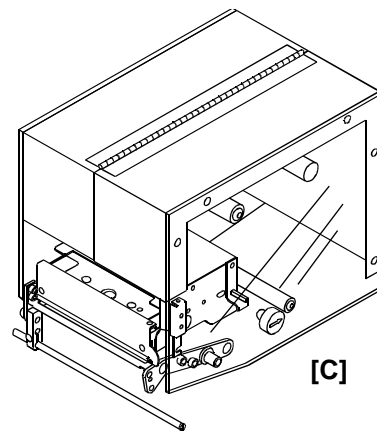


### The Prodigy plus™ print engine [C]

The Prodigy Plus™ print engine is a high-performance direct thermal and thermal transfer label printer.

#### Some Prodigy Plus™ print engine features:

- Clear side door that allows for viewing of the label and ribbon functions.
- Internal time and date clock
- Label feed counter
- Choice of English or metric label data input.
- Equipped with die cut, or blackstripe sensing media.
- Easy-to-load mechanism for label stock and transfer ribbon



- All popular bar codes and nine different alphanumeric fonts resident in memory.
- The 0.0049 inch print element prints high-density bar codes and easy-to-read characters at 203 dot-per-inch resolution. In addition, the pixel size can be multiplied by 2 in the horizontal, and 3 in the vertical direction producing even larger label formats.
- Optional memory and font modules programmable using HP LaserJet1 II (PCL-4) compatibility
- Dot-addressable graphics function; compatible with PCX, IMG file formats
- User selectable and software-selectable print speeds and form dimensions. Prints at speeds of up to 6 inches per second (152.4 mm/sec.) with maximum print quality. In *After Burner™* mode, print speeds of 8 inches per second (203.2 mm/sec.) can be attained for some formats with only a minor reduction in print quality. Print area is 4.1 inches W x 10.0 inches L (104 mm x 254 mm). It has an innovative dot-history control circuit, called SEAQ™ (Sequential Energy Adjustment for Quality) which provides exceptional quality while printing at high speeds. This circuit monitors the printed data and automatically adjusts to provide maximum printhead performance.
- Allows for adjusting printhead temperatures (darkness), print speeds and slew rates.

### **Resident Bar Codes**

The Prodigy Plus print engine has all popular bar codes resident in memory and can print adjacent human readable characters. It has user-selectable bar code ratios and heights.

### **Resident Fonts**

There are nine different size built-in alphanumeric fonts. Font multiplication allows you to print 0.035 inch H (0.9 mm) to 16.0 inches H (406.4 mm). These fonts include OCR-A, OCR-B (size and character set III), and the ninth one, a CG Triumvirate™ smooth font, contains 10 different font sizes. All the fonts can be printed in four different directions.

### **Optional Memory Modules**

There is three optional Memory modules that provide storage for fonts, label formats, and graphic images. These modules are available in RAM, Flash and ROM FONT versions (512K available in RAM only).

256K RAM Memory Module: This module should be used in any application that requires fonts not resident in the printer (i.e. True Type fonts) or for the

direct connect download of a label format (label formats can also be stored and recalled from RAM modules) or graphics (logos). Graphics can be loaded using programs with an image download function. The loading of images can also be done with minimal programming on most host computers. Single font bitmaps, images, or formats cannot be deleted individually. The entire module must be cleared and data reloaded. This module can be installed in either slot A or B. This is a volatile memory (temporary storage) and will be lost at power down.

**256K Flash ROM Module:** This module provides the same features as the RAM modules with the added benefit of permanent storage. Typical applications for a Flash module include downloadable soft fonts, graphics, and label format storage for use with host computers. This module must be installed in slot A when being loaded with data. Once it is programmed they can be installed in either slot A or B. There is a copy command available for duplicating ROM modules. When using this feature, the source module should be installed in the B slot, and the blank module in the A slot. A WRITE PROTECT switch on the Flash module can protect data stored on the module from being overwritten or erased. This module is a non-volatile memory, data is stored permanently.

**512K RAM Module:** This module is used primarily when label formats exceed 10 inches in length. When this module is in the A slot, the dot memory is double (from 10" to 20" at 203 dpi). The upper half of memory is reserved for long label length formatting and the bottom half functions the same as the 256K RAM module. This is a volatile memory (temporary storage) and will be lost at power down.

### **Optional Font Modules**

There are six optional 512K byte ROM FONT modules available. They are:

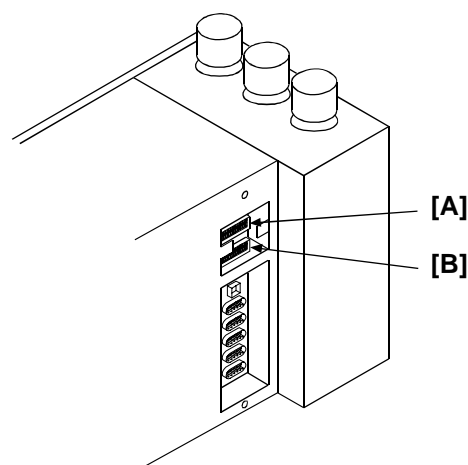
1. CG Triumvirate Bold
2. CG Triumvirate Italic
3. CG Times
4. CG Times Bold
5. Futura Extra Bold Condensed
6. Plantin

Each ROM Font module comes with documentation detailing the type and sizes available on the module and the font number of each size used in the label formatting. ROM Font modules are programmed at the factory and cannot be modified for any other purpose. ROM Font modules will operate in either the A or the B slot.



## Module Slot locations

The PA/4000 Printer/Applicator has two module slots in the rear of the print engine for use with optional memory modules and font modules. The upper slot is referenced, as "A" [A] and the lower slot is "B" [B].



## Print Engine Specifications:

<b>Print Engine</b>	<b>Prodigy Plus™</b>
<b>Print Method</b>	Direct thermal or thermal transfer
<b>Maximum Print Speed</b>	6 inches/second with afterburner speeds up to 8 inches/second
<b>Print Resolution</b>	203 dots per inch
<b>Media Dimensions, Min.</b>	1" x .25" (25.4 mm x 6 mm)
<b>Media Dimensions, Max.</b>	4" x 13" (101.6 mm x 330 mm)
<b>Roll Capacity</b>	13" (330 mm) outer diameter
<b>Fonts</b>	Nine internal fonts. American and European, uppercase and lowercase with descenders. Six optional font modules available.
<b>Bar Codes</b>	UPC-A/E, UPC-E, EAN-8, EAN-13, Code 39, I 2/5, Code 128, Codabar, MSI, 2/5, Code 93, Bookland.
<b>Flexibility</b>	Rotation of bar codes and text in four 90 degree steps; character expansion horizontally and vertically to 12X; RAM storage for special characters, dot-addressable graphics; sequential numbering.
<b>Memory Module Option</b>	Three optional memory modules available: 256K RAM, 256 Flash ROM, and 512K RAM.
<b>Communications</b>	RS-232 (300 → 19,200 bps, Ready/Busy and X-ON/X-Off)
<b>Data Transmission</b>	ASCII

## Print Engine Programming and Support

Programming and support for the print engine is available from Datamax.

**Software**    *Performance Series™*. Diagraph supports Performance Series™ (Premier, Express or Flash) as the software solution for label creation and printing on the PA/4000.

*Windows Drivers*. Datamax provides print drivers through its web site for users who want to print labels from word processors such as Microsoft Word or Word Perfect. These drivers provide compatibility for Windows-based applications but do not take the place of a dedicated label creation and printing program.

**Manuals**    *Datamax Programmers Manual*. Datamax provides a free programmer's manual in pdf format through its web site. This manual explains how to use Datamax Programming Language (DPL) to write programs for Datamax printers that create label formats and control the operation of the printer.

**Address**    Datamax World Headquarters  
4501 Parkway Commerce Boulevard  
Orlando, Florida USA 32808  
(407) 578-8007

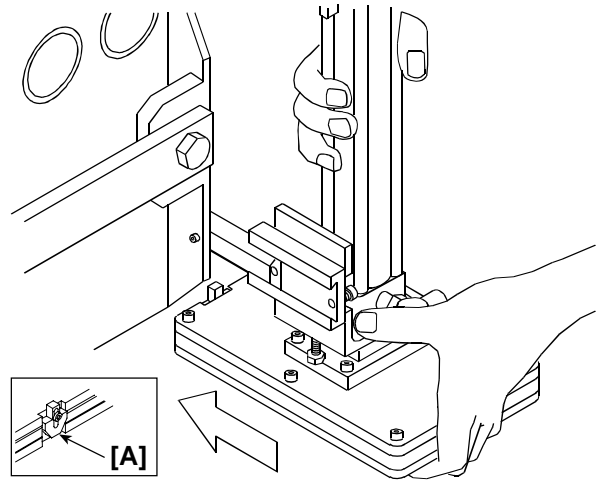
Datamax Tech Support Hotline – (407) 523-5540

**Internet**    <http://www.datamaxcorp.com>

## 2.3 Air Cylinder/Tamp Head Assembly (6" 6105-180 Shown)

There are three sizes of tamp cylinders available: 6, 12 and 18 inch. The Air Cylinder/Tamp pad Assembly attaches to the extended horizontal support bar on the PA/4000 main unit. It comes with a spare tamp pad kit. There are two sensors **[A]** located on the tamp pad:

1. The Label Present Sensor detects when a label is on the tamp pad. The printer will not print another label until the current label has been removed.
2. The Auto-Retract Sensor detects the product. Once the product is detected, the air cylinder will retract.



### Tamp Pads

Tamp pads are available in a wide range of sizes. The available range runs from 4"x 2" up to 7"x 13" with 1/4" increments along the way. As shown below, the part numbering system for these pads includes the size of the pad in the number: For example, the part number for a tamp pad using a four-inch wide by two-inch long label is 6150-223-4000200.

Call Diagram for pricing and availability.

**6150-223-XXXXYYY**

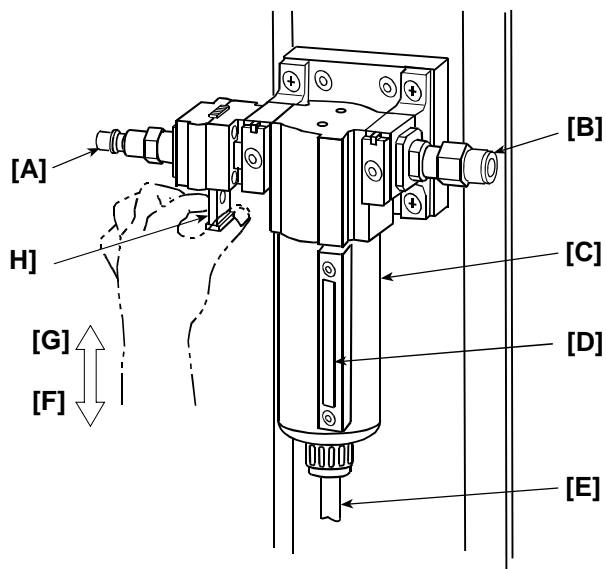
Label length with  
two decimal places  
Label width with  
two decimal places

## 2.4 Air Filter 7505-103

The PA/4000 Air Filter takes the incoming factory air supply and filters out impurities and moisture to give a clean, air supply. The PA/4000 must be supplied with 95-120 psi of clean, dry, and unlubricated air. The air filter comes with the system and is equipped with an OSHA approved air shut-off valve.



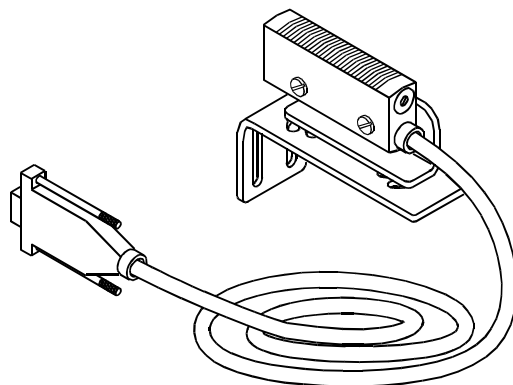
**NOTE:** The air filter will drain out any moisture that has collected while the air was disconnected. It is recommended that the air be shut off when the unit is turned off. If excessive moisture builds up, the supply for incoming air should be checked. An air dryer should be installed in the compressed air supply system if too much water condensation is present.



- [A] Factory air input
- [B] Air output to main unit
- [C] 40 micron element within a metal bowl
- [D] Moisture indicator
- [E] Semi-automatic drain
- [F] Air is Closed or OFF
- [G] Air is Open or ON
- [H] OSHA approved shut-off valve

## 2.5 Photosensor Assembly 5700-216

This assembly includes a diffuse-type self-contained photosensor with a ten foot cable and multi-position bracket mounts. It functions as a switch to start the application cycle when it detects the presence of a product on the conveyor. It senses the presence of a product by receiving LED radiation reflected from a product surface. Adjust the sensing distance of the photosensor with the potentiometer at the rear of the photosensor.

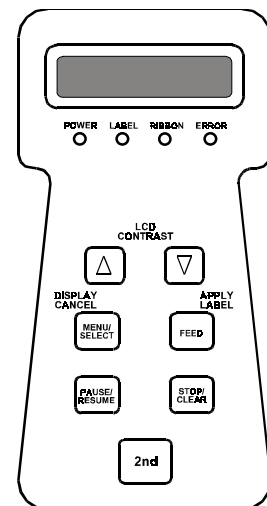


## 2.6 Hand-Held Terminal 6105-260

The PA/4000 terminal is a hand-held device, designed for industrial environments that allows you to control all of the applicator functions needed to print and apply labels.

It has a LCD (Liquid Crystal Display) with a one line by sixteen character text display. The four LEDs show power on and warn of error conditions. The seven control keys are described in Section 5.2.

The hand-held terminal communicates with the PA/4000 main unit through an RJ-11 cable that connects to J1 on the electrical panel on the back of the print engine (see Section 4.12). It sits in its holster attached to the yoke when not in use. See Section 5.2 for more information on configuring print applications with the Hand-Held Terminal.



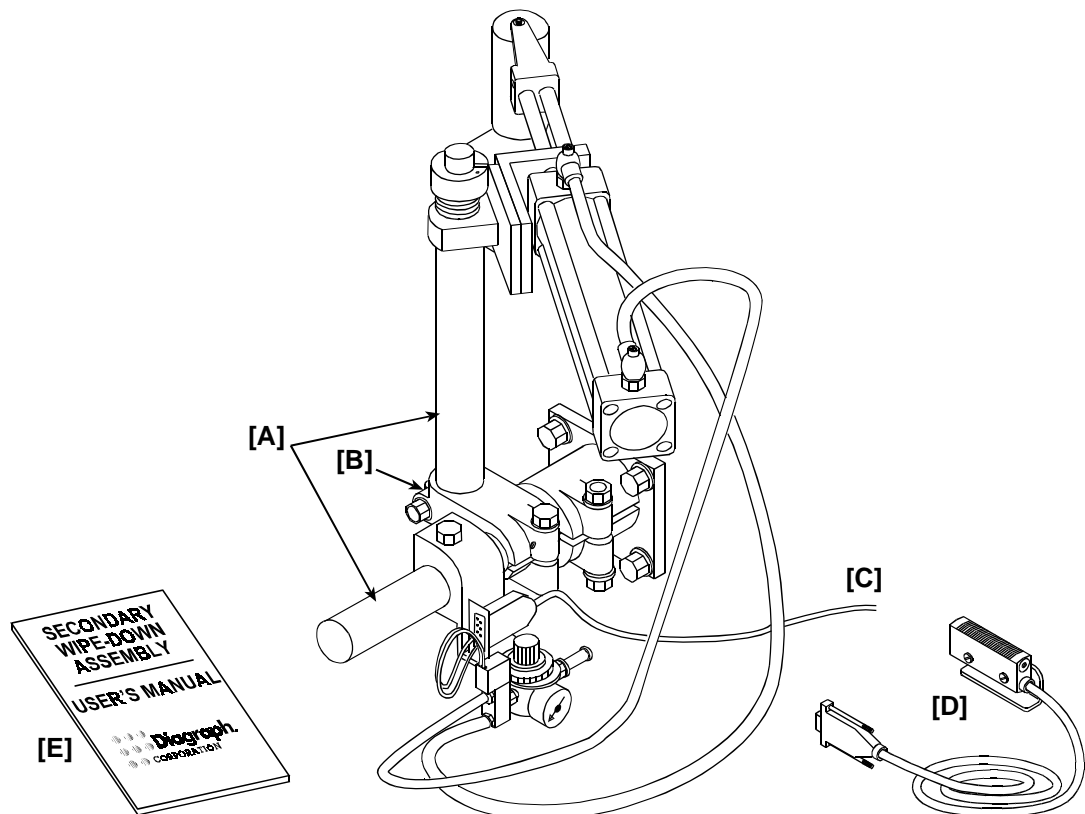
## 2.7 Optional Components

### 2.7.1 Secondary Wipe-Down Assembly 6105-103

A secondary wipe-down unit is used when applying labels onto two adjacent panels of a carton. The primary applicator applies part of the label onto one surface and the secondary wipe-down roller pushes the unattached portion onto the second surface.

The PA/4000 supplies both electric (24 VDC) and air (0-100 PSI) power. The assembly includes bracketry **[A]**; a tee fitting **[B]**; an interconnect cable **[C]** and a photosensor **[D]** that acts as the signal source to initiate the cylinder stroke. This assembly also includes the *Secondary Wipe-Down Assembly User's Manual* **[E]** (5802-930) which contains complete installation and operation instructions.

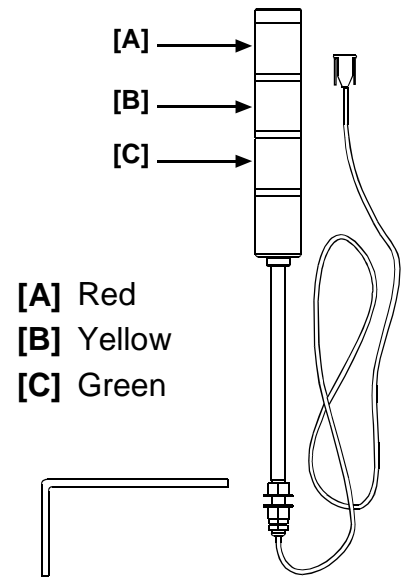
This unit comes bundled with the PA/4020 or can be purchased separately.



### 2.7.2 Warning Tower 6150-320

The warning tower assembly provides visual feedback when error conditions occur. This assembly includes the tower, the mounting hardware and a signal cable.

CONDITION	GREEN	YELLOW	RED
<b>Label Low</b>	Solid	Flashing	OFF
<b>Ribbon Low</b>	Solid	Flashing	OFF
<b>Label Out</b>	OFF	OFF	Flashing
<b>Ribbon Out</b>	OFF	OFF	Flashing
<b>Printer Paused</b>	Flashing	Solid	OFF
<b>Cylinder Error</b>	OFF	OFF	Flashing
<b>Printer Error</b>	OFF	OFF	Flashing



## 3.0 PACKAGING

### 3.1 Containers

The basic PA/4000 without options ships in three containers. Unpacking requires two people.

<b>CONTAINER #1</b>	<ul style="list-style-type: none"> <li>1 Tee base</li> <li>2 ¾ inch x 5 inch bolt with flat washer</li> <li>1 Stand upright piece</li> <li>1 ¾ inch bolt with washer and nut for chassis mount</li> <li>1 Crank handle for height adjustments</li> <li>1 Yoke</li> <li>1 Air filter assembly with mounting hardware</li> </ul>
<b>CONTAINER #2</b>	<ul style="list-style-type: none"> <li>1 Chassis Assembly with Prodigy Plus™ Print Engine</li> <li>1 PA/4000 User's Manual</li> <li>1 Power Cord</li> <li>1 Hand-Held Terminal</li> <li>1 Holster with mounting hardware</li> <li>1 Cable</li> <li>1 Label Inner Supply Disk</li> <li>1 Label Outer Supply Disk</li> <li>1 Photosensor with mounting hardware</li> </ul>
<b>CONTAINER #3</b>	<ul style="list-style-type: none"> <li>1 Air Cylinder/Tamp Head Assembly with spare tamp pad kit and mounting hardware</li> </ul>

<b>Optional Container Warning Tower</b>	<ul style="list-style-type: none"> <li>1 Warning tower assembly with cable and mounting bracket and hardware</li> </ul>
<b>Optional Container Wipe-Down Assembly</b>	<ul style="list-style-type: none"> <li>1 Wipe-down assembly, air hose, spare roller, user's manual, magnetic switch assembly, power supply, photosensor/cable assembly, T-fitting and opposite torsion spring and mounting hardware</li> </ul>



## 4.0 INSTALLATION

### 4.1 Overview

Instructions in this section show the PA/4000 in a top down configuration, that is with the print engine upright and labels applied on top of the product. The size of the PA/4000 necessitates two people for installation.

Review Section 1.1 for power and air requirements.

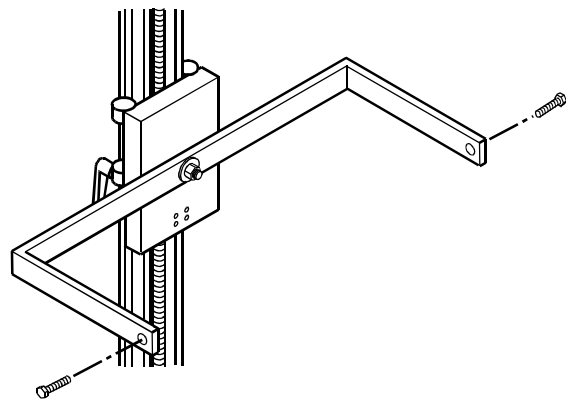
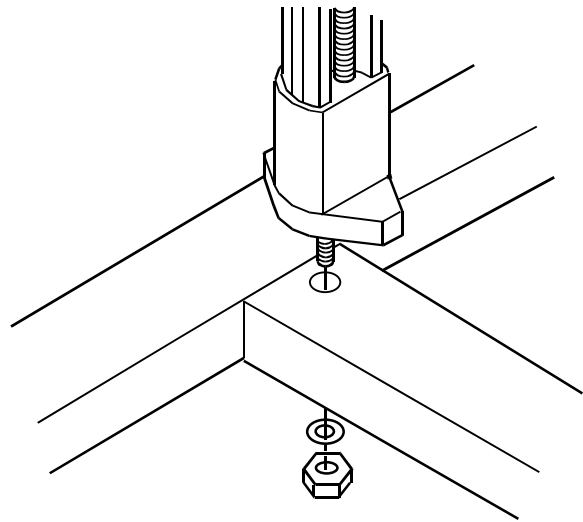
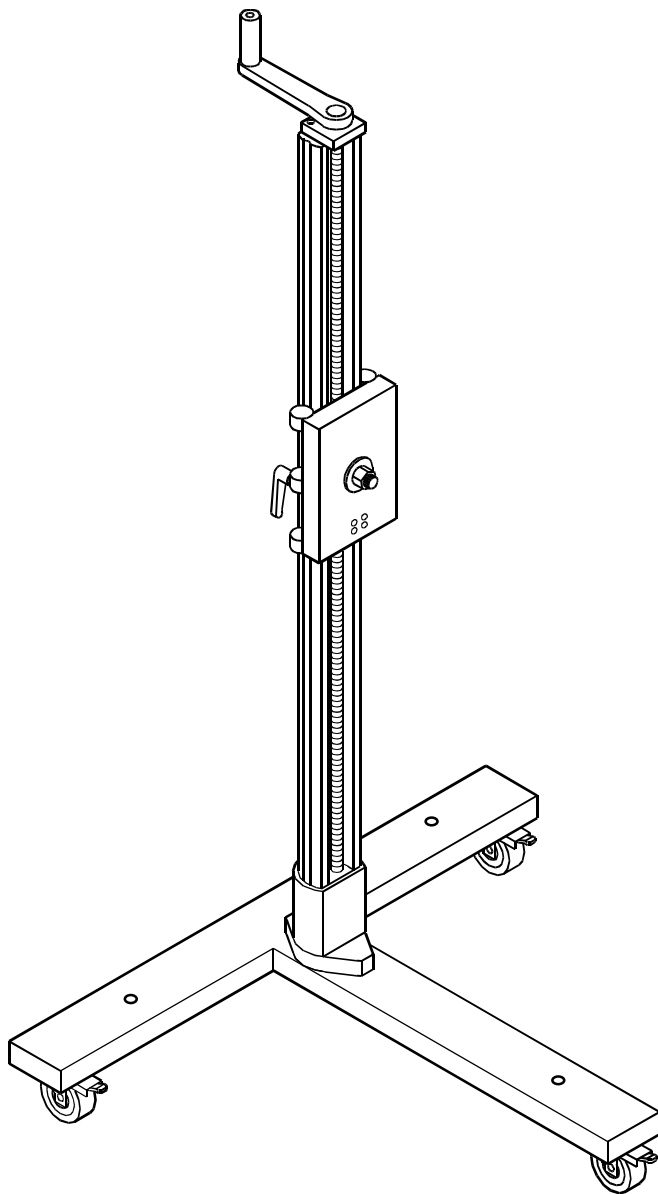
**Tools:** Installation and configuration of the PA/4000 requires the tools listed below:

- Set of socket wrenches with a socket as big as 1 1/8 inch
- Utility knife
- Sets of Allen wrenches, U.S. and metric
- Phillips #1 screwdriver
- Phillips #2 screwdriver
- Small slotted tip screwdriver
- Medium slotted tip screwdriver
- Diagonal cutters
- 9/16 inch box wrench
- 15/16 inch open-end wrench (optional)

### 4.2 Assembling the Stand

- Parts:**
- 1 Tee base
  - 1 Upright post
  - 1 Nut for upright to base connection
  - 1 Crank handle
  - 1 Yoke

- Assembly:**
1. Position the upright post on the tee base and tighten in place with the nut, flat washer and lock washer provided.
  2. Lock casters to prevent the stand from rolling during assembly.
  3. Place the crank handle on top of the post for height adjustment of the yoke mounting plate.
  4. Attach the yoke to the mounting plate with the washer and nut provided.
  5. Once the unit is positioned on the line for print and apply operation, bolt the unit to the floor through the 3 holes provided on the t-base of the stand.



### 4.3 Mounting the Main Unit to the Stand



**NOTE:** The Main Unit assembly [B] weighs over 150 pounds. It is best to have help to connect it to the yoke. Exercise care when attaching the main unit to the yoke to avoid bending the air assist tube [C] at the bottom of the print engine.

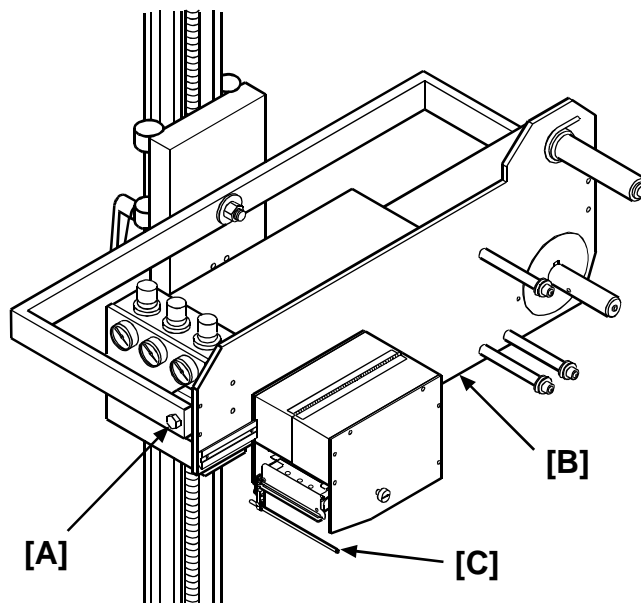
**Tips for attaching the main unit to the yoke by yourself:**

1. Place the main unit on a work surface. The surface should allow for the base of the stand to roll under it so that the post can touch it.
2. Roll the stand to the surface so that the base rolls under the surface and the post touches it.
3. Lower the stand with the crank handle so that the yoke mounting bolts [A] line up with the mounting holes on the main unit. Attach and tighten the bolts.
4. Raise the main unit up and off the surface with the crank handle on the top of the stand and roll the unit away from the surface for further assembly.

**Parts:** 1 PA/4000 main unit [B]

**Assembly:**

1. Attach the main unit to the yoke with bolts provided [A].
2. Make sure the yoke/main unit assembly is level and secure before proceeding.

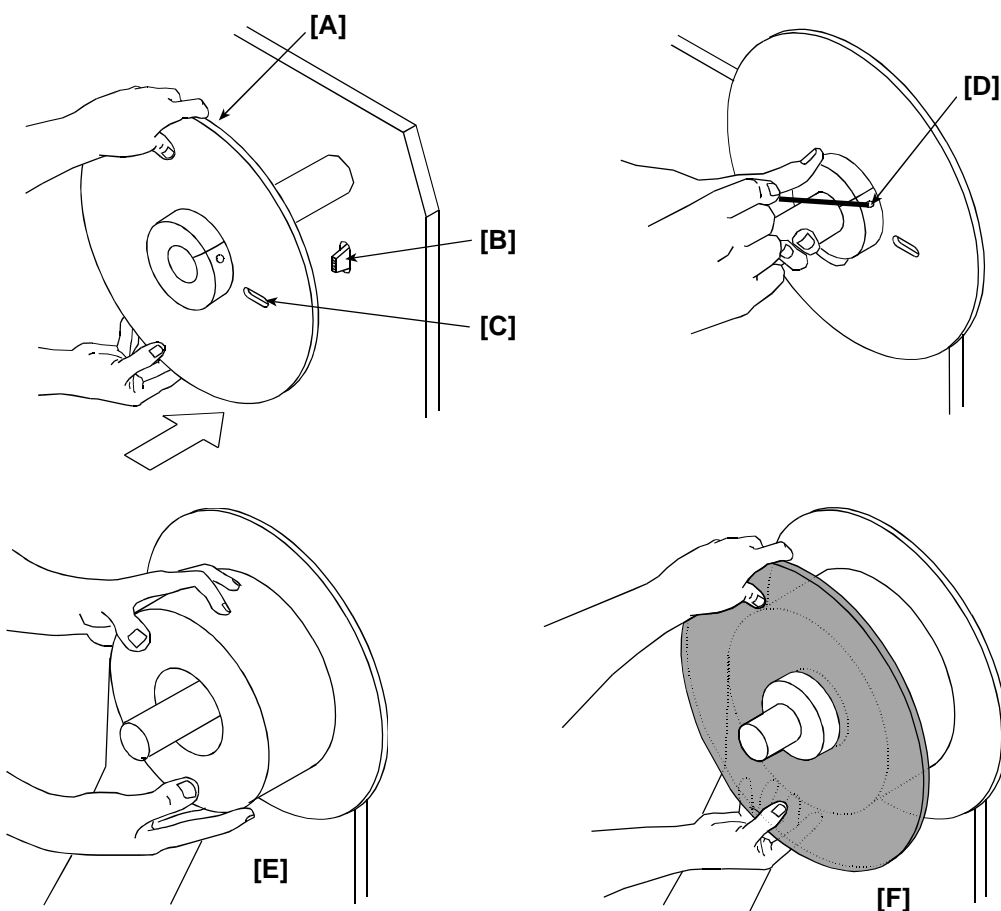


## 4.4 Mounting Attachments to the Main Unit

### 4.4.1 Attaching the Label Supply Disc

- Parts:**
- 1 Aluminum Rear Label Supply Disc **[A]**
  - 1 Smokey Plexiglass front Label Supply Disc **[F]**

- Assembly:**
1. With an Allen wrench, loosen the set screw **[D]** on the plastic collar that is attached to the aluminum rear label supply disc.
  2. Slide the aluminum rear label supply disc **[A]** (with the collar facing toward you) onto the label supply hub. The label sensor slot **[C]** on the disc allows the label low sensor **[B]** to sense when the label roll gets low. After the disc is in position tighten the set screw **[D]** with an Allen wrench,
  3. Load the label roll onto the hub **[E]** (see label loading instructions in Section 4.13).
  4. Slide the plexiglass smoke-colored front label supply disc onto the label supply hub **[E]**. It will be a tight fit so you will need to tap it in gently. Be sure that the flanged collar fits into the label roll core.

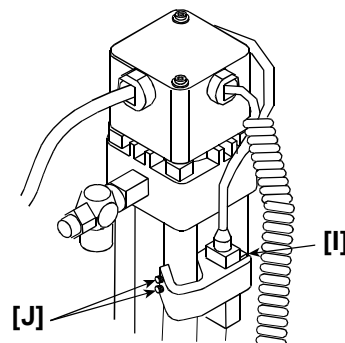
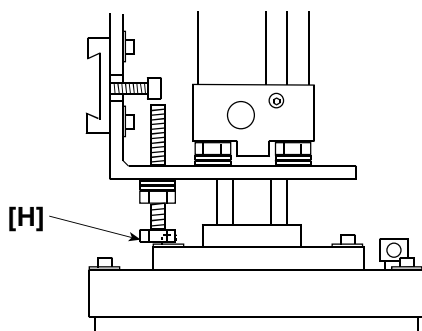
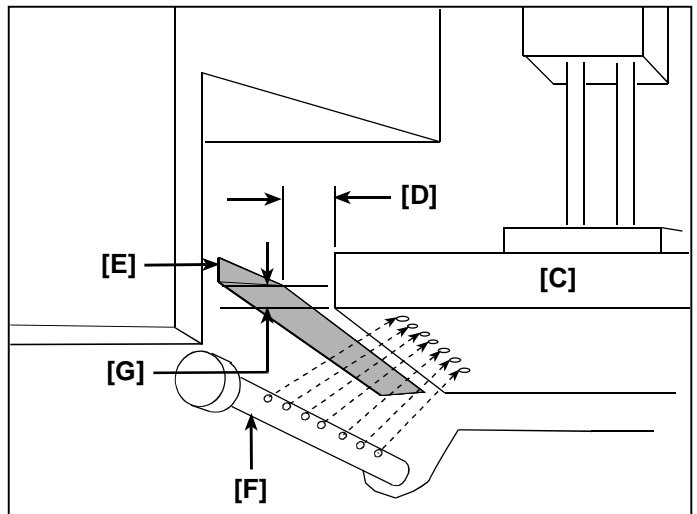
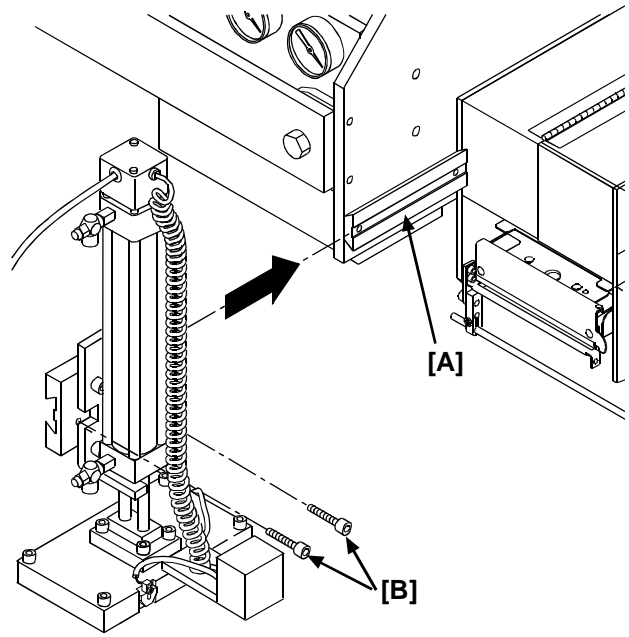


#### 4.4.2 Attaching the Air Cylinder/Tamp Pad

- Parts:**
- 1 Air Cylinder/Tamp Pad
  - 1 Support bar and hardware

##### Assembly:

1. Slide the air cylinder/tamp pad assembly onto the extended horizontal support bar **[A]** on the PA/4000 main unit.
2. Position the assembly so the tamp pad **[C]** rests  $\frac{3}{16}$  inch **[D]** from the peel blade **[E]** on the print engine. Before you tighten the assembly into position, manually extend the tamp pad **[C]** to make sure that it will not hit the air assist tube **[F]**. Tighten the two 10-32 socket head screws **[B]** using a  $\frac{3}{32}$  inch Allen wrench.
3. Fully retract the tamp pad. The bottom of the tamp pad **[C]** should be  $\frac{1}{16}$  inch **[G]** lower than the peel blade **[E]** position. To attain this, adjust the stop bolt **[H]**.
4. Plug the cable into J5 of the electrical panel on the rear of the main unit, see Section 4.12. Plug in and power ON the system.
5. The cylinder home switch **[I]** (located near the top of the cylinder) must be positioned so that the red LED is ON when the cylinder is fully retracted and the stop bolt **[H]** is against the tamp pad. Loosen the set screws **[J]** with an Allen wrench and move the cylinder home switch up or down until the LED lights. Tighten the set screws **[J]**.



## 4.5 Air Tube Connections

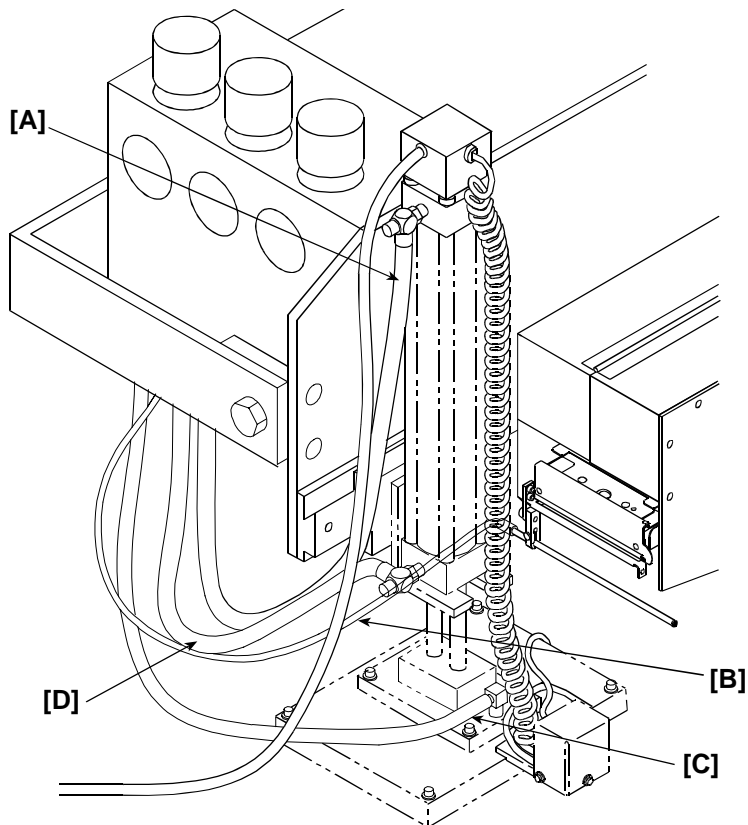
- Parts:**
- 1 1/4 inch clear air tube marked "VAC"
  - 1 1/8 inch clear air tube marked "AIR ASSIST"
  - 1 1/4 inch clear air tube marked "TOP"
  - 1 1/4 inch clear air tube marked "BOTTOM"

**Assembly: Vacuum Tube Connection**

Connect the 1/4 inch clear air tube marked "VAC" [C] to the brass vacuum input located on the tamp pad.

**Air Assist Tube Connection**

Connect the 1/8 inch clear air tube marked "AIR ASSIST" [B] to the input located on the blow tube of the print engine.



**Air Cylinder Top**

Connect the 1/4 inch clear air tube marked "TOP" [A] to the input located on the top of the air cylinder.

**Air Cylinder Bottom**

Connect the 1/4 inch clear air tube marked "BOTTOM" [D] to the input located on the bottom of the air cylinder.



NOTE: See Section 5.4 for configuration of the air cylinder/tamp pad.

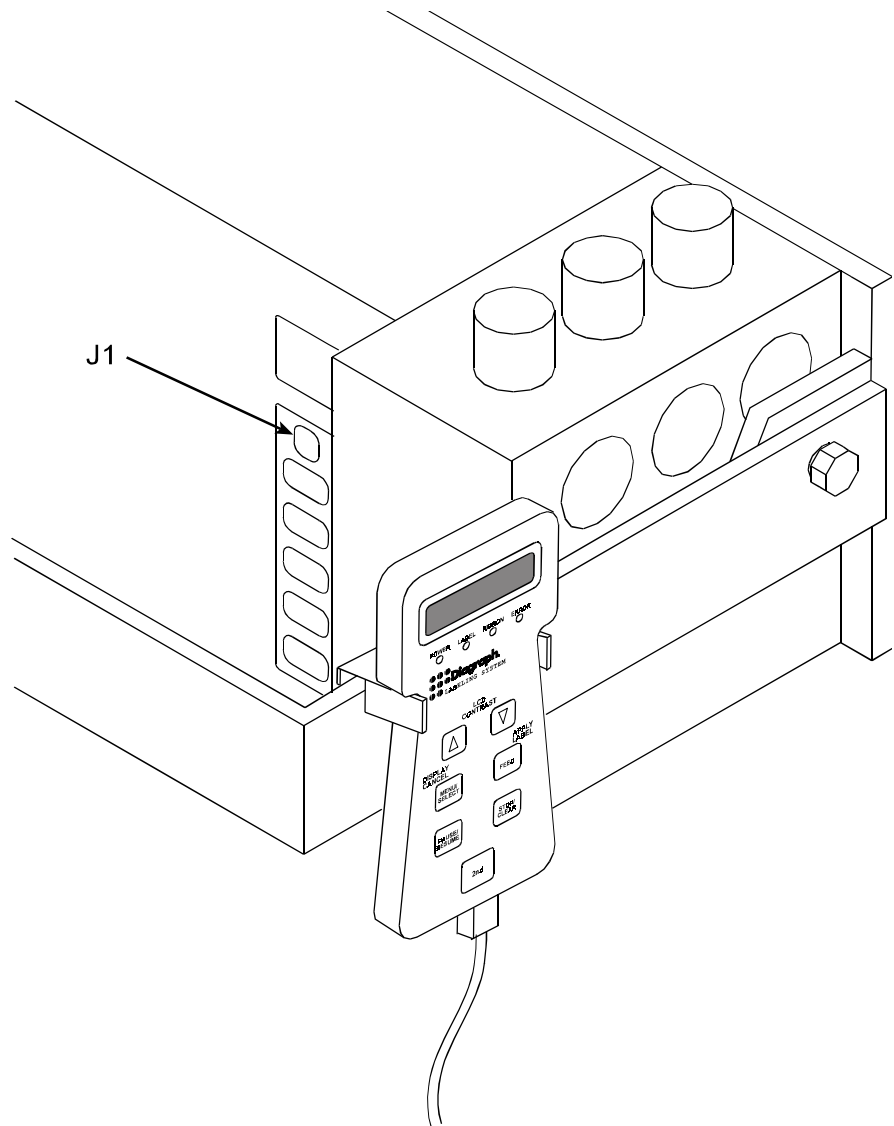
## 4.6 Mounting the Hand-Held Terminal with Holster

- Parts:**
- 1 Holster
  - 1 Hand-Held Terminal

**Assembly: Mount the Holster to the Yoke**

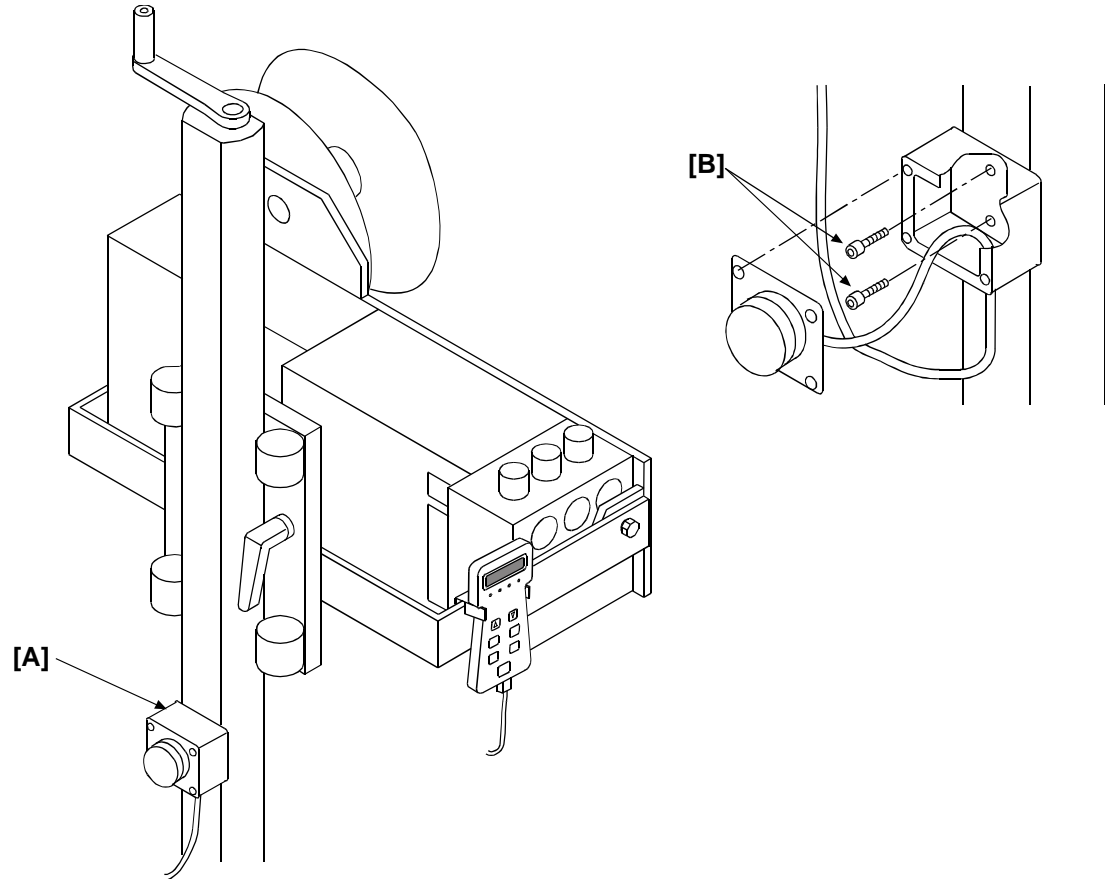
The holster can be hung over the side of the yoke.

Place the Hand-Held Terminal into the holster and plug into J1 of the electrical panel on the rear of the main unit.



## 4.7 Mounting the E-stop to the Stand

The E-stop attaches to the middle of the upright part of the stand assembly **[A]**. Remove the E-stop cover and use the opened box for a template for drilling the two holes needed to bolt it to the stand. Secure it to the stand with the two Allen bolts provided **[B]**. Replace the E-stop cover after mounting. Plug the E-stop into \_\_\_\_\_





## 4.8 Mounting the Air Filter Assembly to the Stand

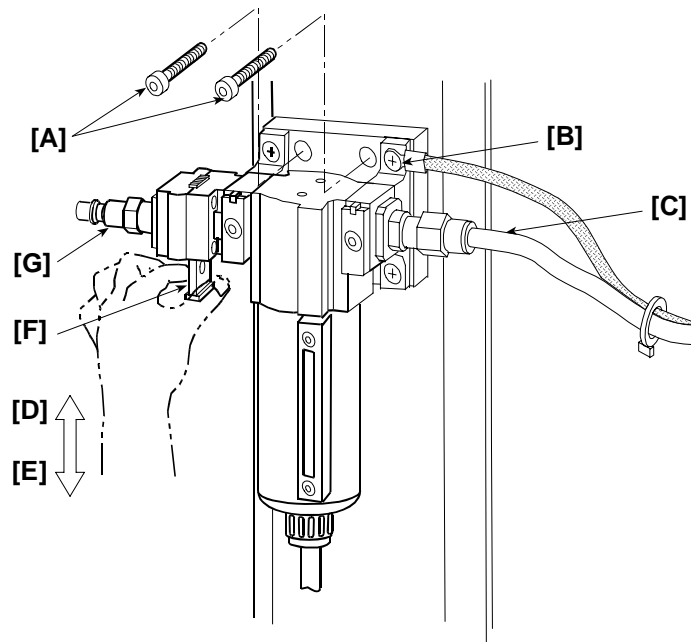
*The filter assembly comes equipped with an OSHA approved air shut-off valve [F]. To turn on the air, push the OSHA approved shut-off valve up (Open) [D].*

**Parts:** 1 Air filter assembly with screws

**Assembly:** Attach the air filter assembly to the stand with the provided Allen bolts [A] using a 3/16 inch Allen wrench. Attach the ground cable from the main unit to the screw indicated at [B]. This ground cable provides ground bonding between the stand upright and the PA/4000 Main Unit. Attach the air output hose from the main unit to [C]. Attach the factory input air hose to [G]. Use clean unlubricated air supply (95-120 psi – 3 cfm).



**NOTE:** To warn others not to turn on the air until the PA/4000 can be serviced, “Tag” the air shut-off valve [E] when it is in the closed position. Tag the unit in accordance with OSHA policies.



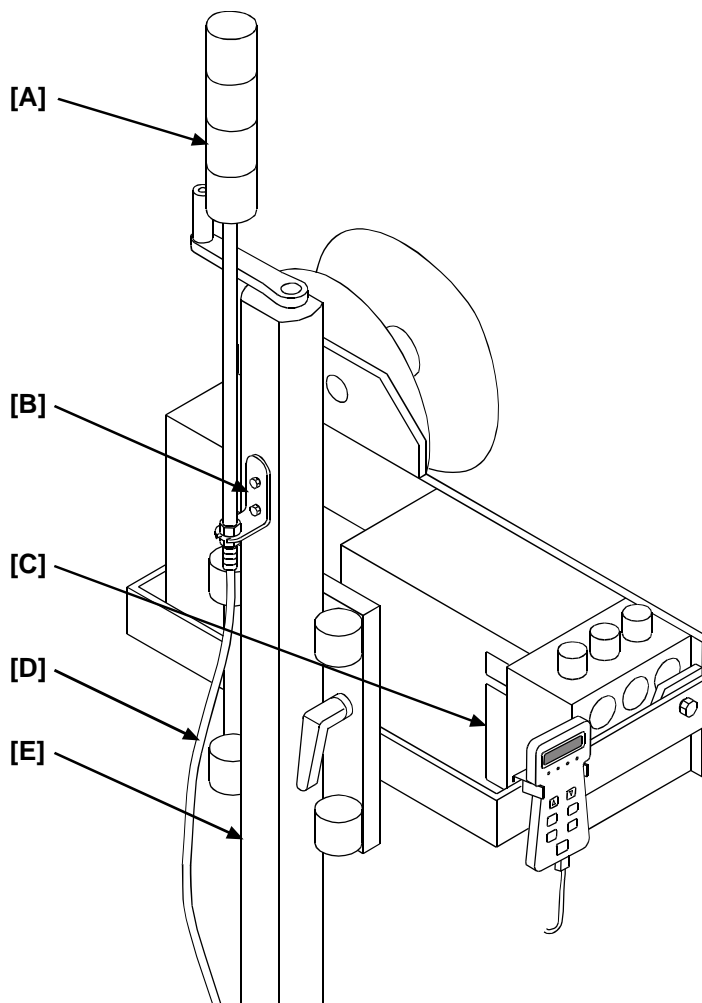
## 4.9 Mounting the Optional Warning Tower to the Stand

*If your system does not have a warning tower, move to the next section.*

**Parts:** 1 Warning Tower **[A]** with cable **[D]**, mounting plate and hardware **[B]** (P/N 6150-320)

**Assembly:**

1. Screw the mounting plate **[B]** onto the stand **[E]** with the 1/4 inch Allen bolts provided using a 3/16 inch Allen wrench.
2. Loosen the cable grommet and the adjacent nut on the end of the warning tower. Let the grommet and nut slide down the cable.
3. Holding the tower upright, pass the tower through the slot in the mounting plate **[B]**. Tighten the nut under the mounting plate and re-attach the cable grommet.
4. Plug the DB9 plug into connection J4 on the electrical panel on the back of the print engine **[C]** (see Section 4.12) and hand tighten the jackscrews.

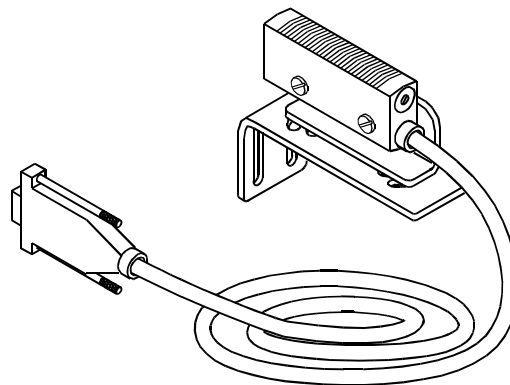


## 4.10 Mounting the Photosensor

*The distance between the photosensor and the PA/4000 is not crucial. A good guideline is to place the photosensor as close as possible to the applicator.*

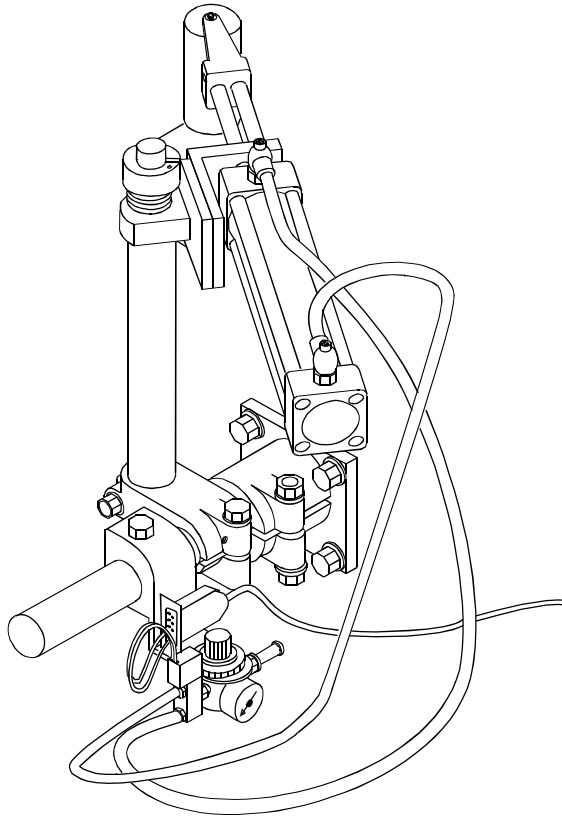
**Parts:** 1 Diagraph photosensor kit P/N 5700-216

- Assembly:**
1. Mount the photosensor to the conveyor using the bracket and hardware provided. Position the photosensor where it will not be tripped by the next product prior to completion of the product delay on the first product. Improper positioning will result in missed products. Adjust the sensing distance of the photosensor with the potentiometer at the rear of the photosensor.
  2. Tighten screws with a Phillips screwdriver and a 5/16-inch wrench.
  3. Measure the distance from the photosensor to the peel blade on the print engine and record this measurement on the PA/4000 Configuration sheet, see Section 6. You will need this information later during the configuration of this system.
  4. Make sure the power is OFF and connect the photosensor to J2 on the electrical panel on the back of the print engine, see Section 4.12.



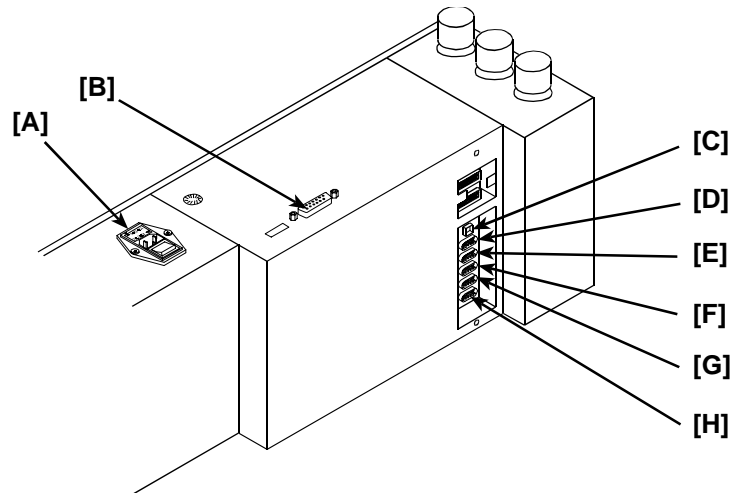
## 4.11 Mounting the Optional Secondary Wipe-Down Applicator

*If your system has a secondary wipe-down applicator, follow the installation and operation instructions in the Secondary Wipe-down User's Manual (5802-930).*



## 4.12 Electrical Connections

The following installation notes cover ALL cable connections. Skip any directions for connecting devices that are not included in your system.



### Rear Panel Inputs

#### *Hand-Held Terminal*

Connect the RJ-11 cord to input J1 [C]. Place the terminal in its holster when not in use.

#### *Photosensor 1*

Connect the photosensor 1 cable to input J2 [D]. When using a single photosensor, position it so that the secondary wipe-down cylinder has actuated prior to the next photosensor trip.

#### *Photosensor 2 (Optional)*

For the PA/4020 Dual Panel Applicator with the secondary wipe-down applicator using a second photosensor. Connect the photosensor cable to input J3 [E].

#### *Photosensor Out (Optional)*

For the PA/4020 Dual Panel Applicator with a secondary wipe-down applicator. Connect the photosensor output cable from the photosensor out slot on the secondary wipe-down unit to input J6 [F].

#### *Warning Tower (Optional)*

Connect warning tower cable to input J4 [G].

#### *Sensor for Air Cylinder/Tamp Head Assembly*

Connect the sensor cable from the Tamp Head to input J5 [H].

### Top Panel Inputs

#### *Power Cord*

Connect the power cord [A].

#### *Rs-232 Computer Cable*

Connect the computer cable from your PC's serial port to RS-232 [B].

### 4.13 Loading the Label Roll

Follow the label web path shown on the label inside the print engine.

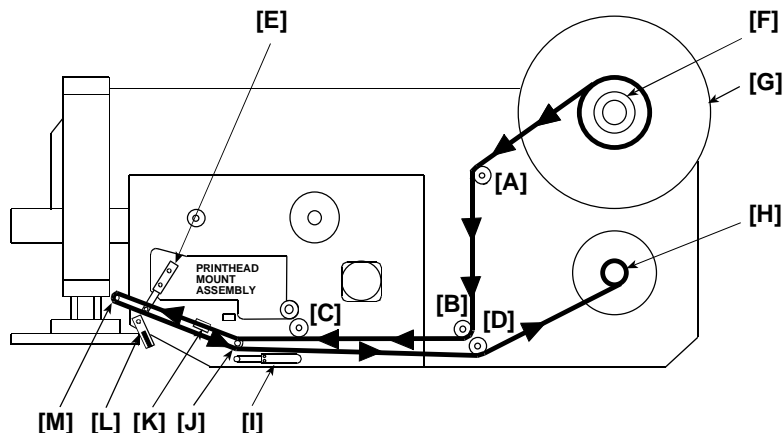
1. Remove the outer supply disk from the label supply hub **[F]** and set aside.

2. Remove the wire clip from the take-up spool **[H]**.

3. Open the clear printer engine cover.

4. On the printer engine, release the printhead lift lever **[E]** and the pinch roller release lever **[I]**.

5. Unpack a roll of labels and remove enough labels to leave approximately two feet of exposed label liner.



6. Load the label roll onto the supply hub **[F]** so that the labels spool off to the left. Push the label roll flush against the inner supply disk **[G]** making sure that the label core seats firmly on the guide collar.

7. Support the label roll with one hand while replacing the outer supply disk with the other hand. Make sure the guide collar seats inside the label core.

8. Spool off the labels over the guide roller **[A]**.

9. Feed the labels under the guide roller **[B]**.

10. Route the liner between guide roller **[C]** and the pinch roller **[J]**.

11. Pull the labels to the left and through the label edge sensor **[K]**. This sensor locates the leading edge of a label, by measuring the level of opaqueness. You can move it left and right to accommodate different activators (label edge or backprinted, black stripe). The black stripe sensor locates the leading edge of a label by measuring the level of reflectivity instead of a change in opaqueness.

12. Loop the labels over the label peel blade **[M]** and make a u-turn with the liner to the right. Route the liner between the air assist tube **[L]** and the pinch roller **[J]**. Take care not to route the labels under the air assist tube.

13. Feed the liner under guide roller **[D]**. Be sure all label guide roller collars on **[A]**, **[B]**, **[C]** and **[D]** are flush with the label edge.

14. Route the liner counter-clockwise onto the take-up spool **[H]**. Anchor in place with the wire clip.

15. Check that the leading edge of the label at the printhead is square with the printhead and that the stock is positioned all the way into the assembly.

16. Lock down the printhead lift lever **[E]**.

17. Turn the label take-up spool **[H]** counter-clockwise very gently (liner tears easily) until there is no slack in the liner between the peel blade **[M]** and the pinch roller **[J]**. While maintaining the tension in the liner, engage the pinch roller release lever **[I]**.

18. Press the FEED key on the Hand-Held Terminal.

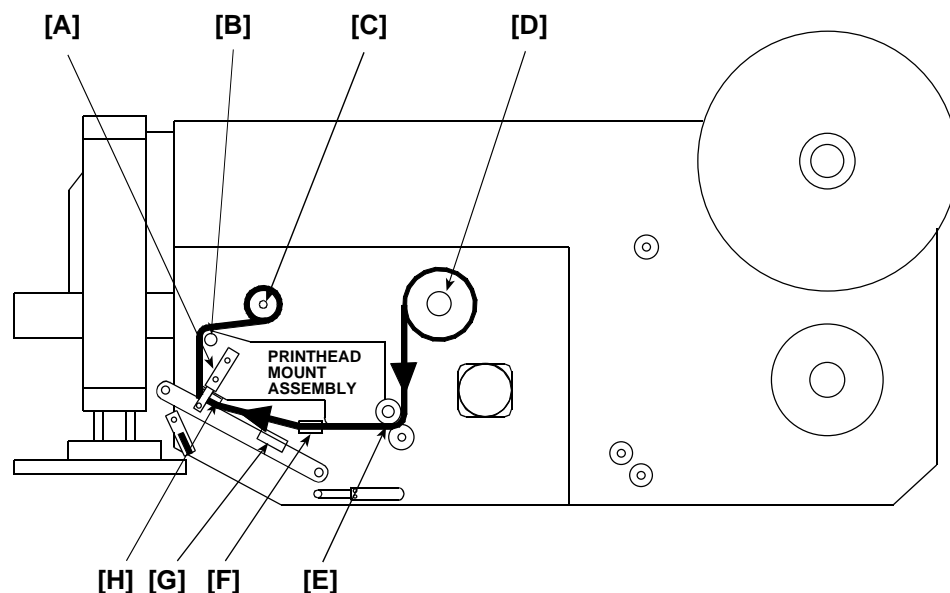
## 4.14 Loading the Ribbon Roll

Follow the diagram of the ribbon path inside the print engine cover.

1. Raise the printhead lift lever **[A]**.
2. Remove remaining ribbon from the ribbon rewind roller **[C]**.
3. Unwrap ribbon roll from the package. Do not remove the ribbon leader and the adhesive edge.
4. Slide the ribbon roll completely onto the ribbon supply hub **[D]** so that the ribbon leader feeds off to the left.
5. Feed the leader to the left under the ribbon idler **[E]**.
6. Pass the leader under the printhead mount assembly. Be sure the ribbon passes through the center of the ribbon sensor **[F]** and above the label edge sensor **[G]**.
7. Pull the leader through, past the ribbon shield **[H]**, and over the top of the ribbon idler roller **[B]**.
8. Pull the leader to the ribbon rewind roller **[C]**.
9. Anchor the leader to the rewind roller **[C]** with either the clasp or the adhesive edge on the leader. Securing with the adhesive edge requires an empty ribbon fiber core.
10. Wind the leader counter-clockwise onto the rewind roller **[C]**. Continue until all of the leader wraps onto the rewind roller **[C]** and only the ribbon is exposed (approx. 12 turns).
11. Make sure that the ribbon is feeding smoothly along its path.
12. Lock down the printhead lift lever **[A]**.
13. Close the print engine cover.



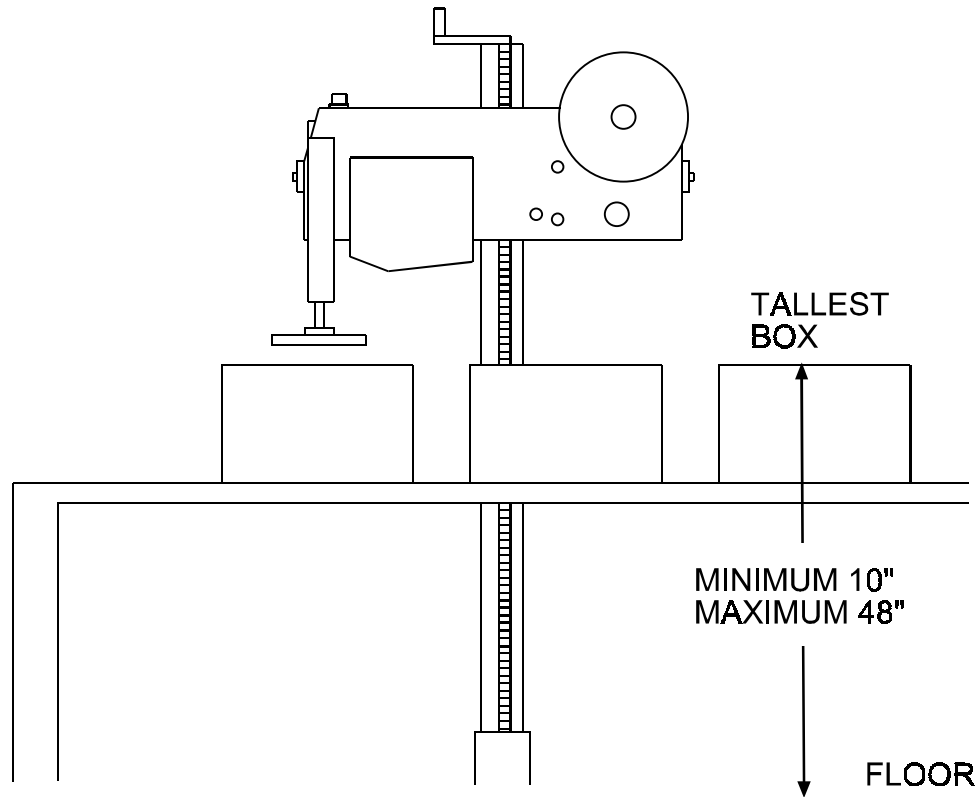
**NOTE:** Clean the printhead every time you replace the ribbon to maintain print quality and extend printhead life.



## 4.15 Minimum and Maximum Distances for the PA/4000

### ***Top Down Application***

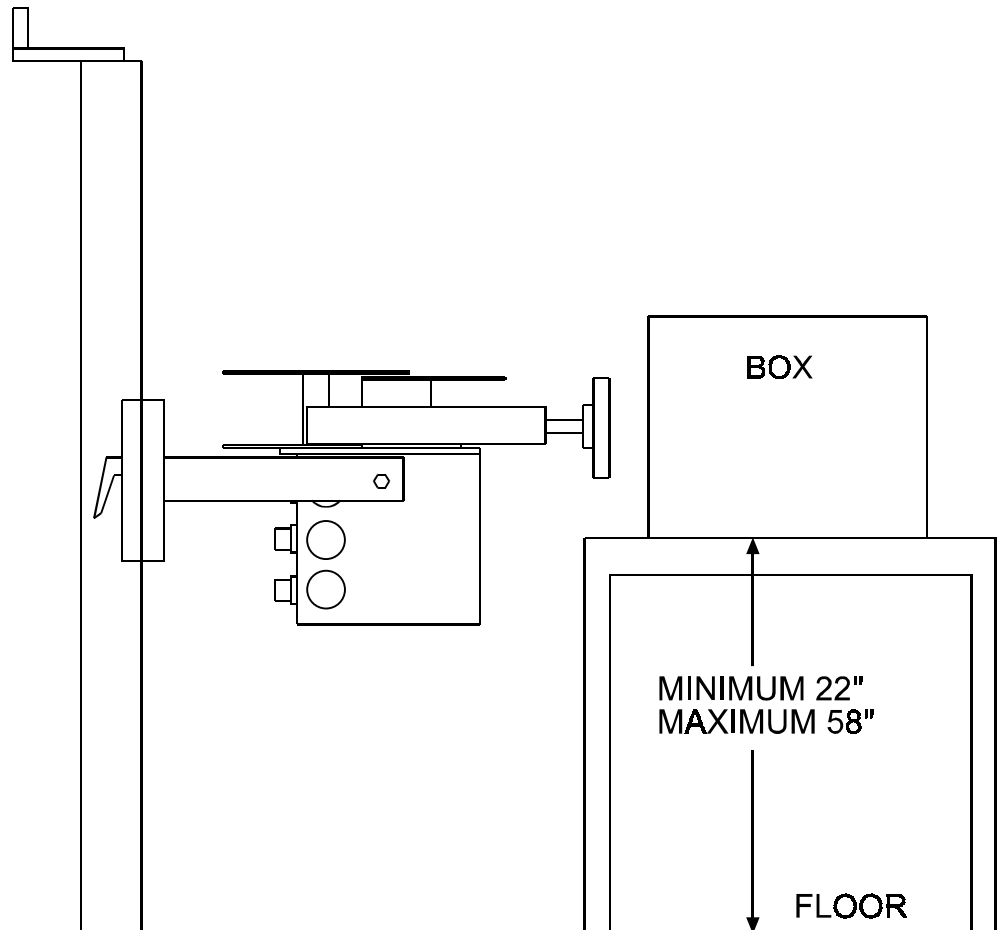
In this configuration, the PA/4000, with a 6 inch tamp cylinder, applies labels to the top panel of a carton. The height of the conveyor plus the tallest box must be greater than 10 inches and less than 48 inches.





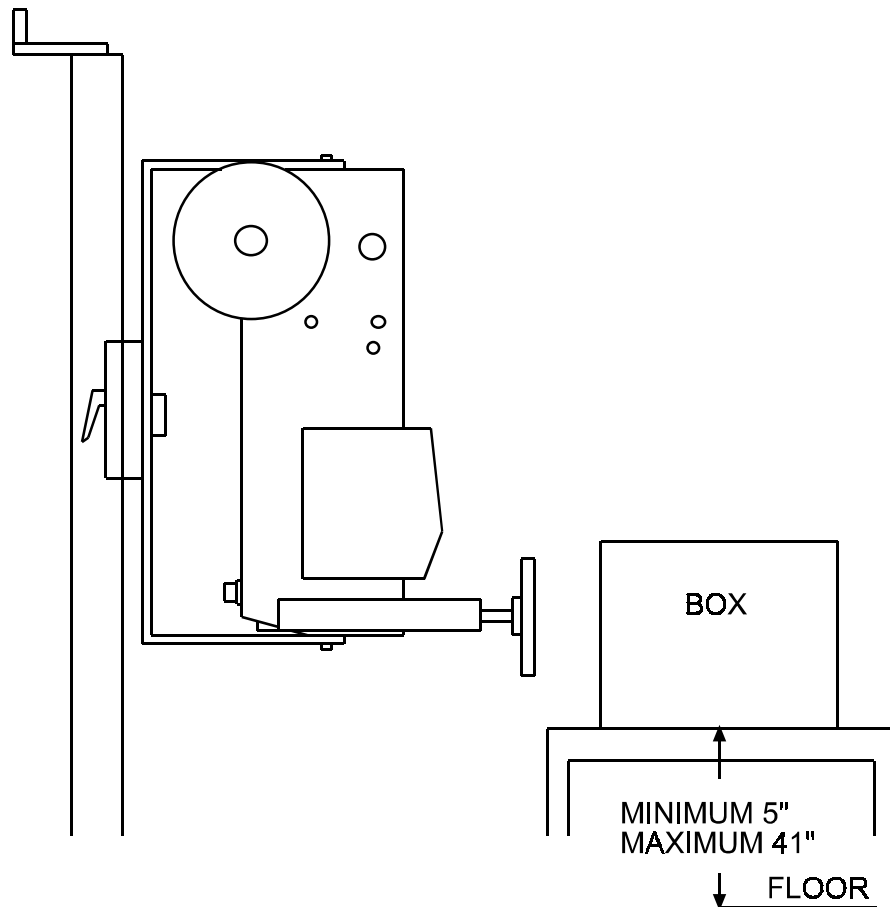
***Side Panel Application, Nose Down***

In this configuration, the PA/4000 applies labels to the side panel of a carton. For this setup, the height of the conveyor must be greater than 22 inches and less than 58 inches.



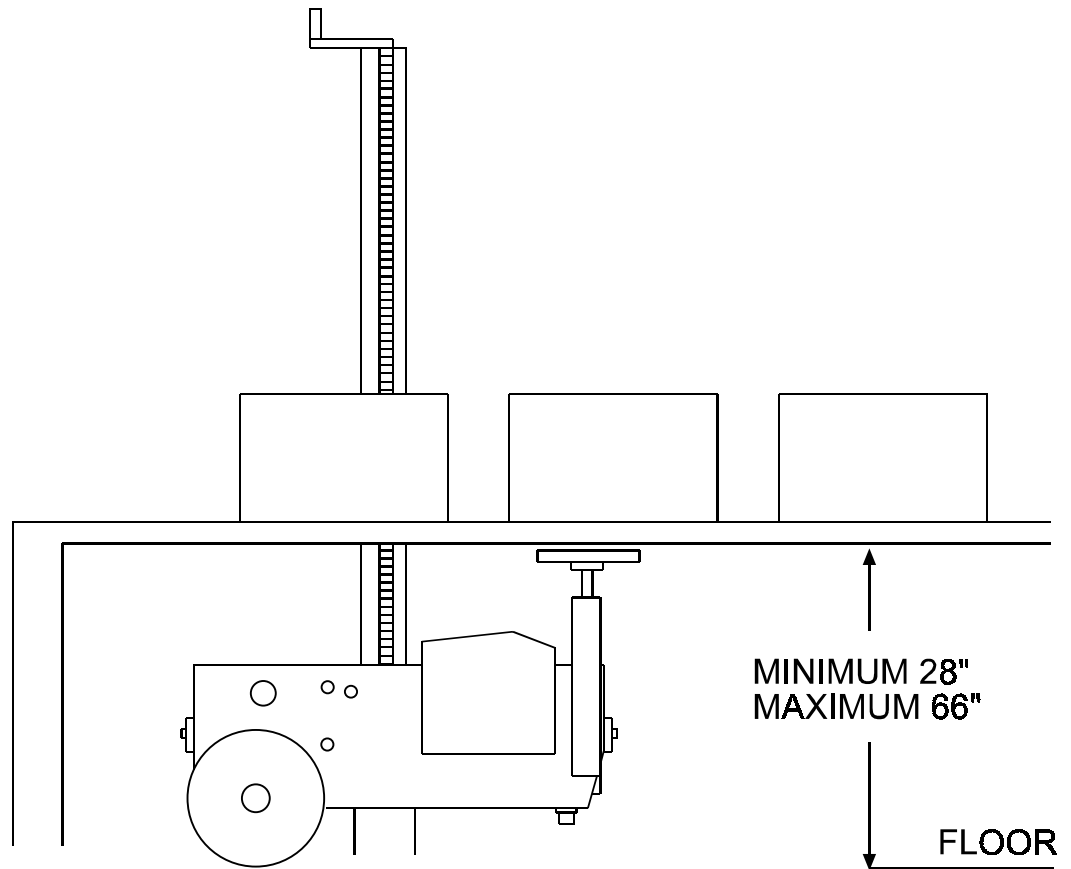
***Side Panel Application, Nose Up***

In this configuration, the PA/4000 applies labels to the side panel of a carton. The distance from the back of the tamp plate to the floor must be greater than 30 ½ inches and less than 62 inches.



### ***Bottom Up Application***

In this configuration, the PA/4000 applies labels to the bottom panel of a carton. The distance from the tamp plate to the floor must be greater than 30 inches and less than 65 inches.



## 4.16 Final Positioning

1. Disconnect power cords and the air line if they will hinder the movement of the PA/4000.
2. Unlock casters.
3. Carefully push the PA/4000 into its position next to the conveyor.
4. Bolt the PA/4000 to the floor through the holes in the t-base.
5. Make necessary connections such as power cords, airline and photosensor cable.

## 5.0 CONFIGURATION

### 5.1 Power Module Configuration

#### 5.1.1 Configuring the Power Module for the 110/120VAC Application



*Failure to use proper fuses and/or install the fuse assembly for correct voltage can damage the PA/4000.*

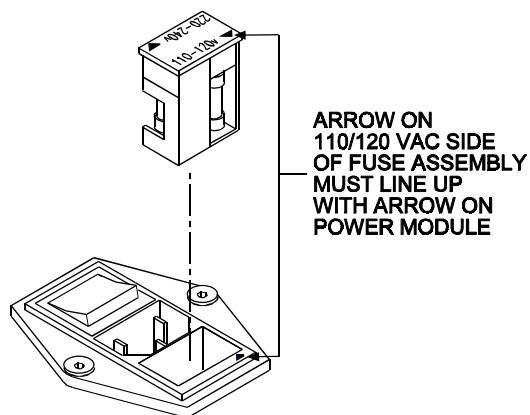
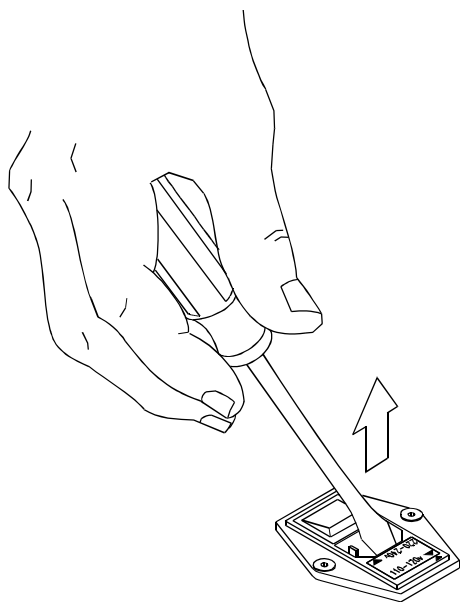
Disconnect the power cord before servicing the power module.

Pop the fuse assembly up and out of the power module with a flat head screwdriver.

Once out of the power module, turn the fuse assembly so that the arrow on the 110/120VAC side of the assembly is lined up with the arrow on the power module.

Replace the fuse assembly.

See Fuse Replacement Kit Instructions 6105-383N when needing to replace a fuse.



### 5.1.2 Configuring the Power Module for the 220/240VAC Application



*Failure to use proper fuses and/or install the fuse assembly for correct voltage can damage the PA/4000.*

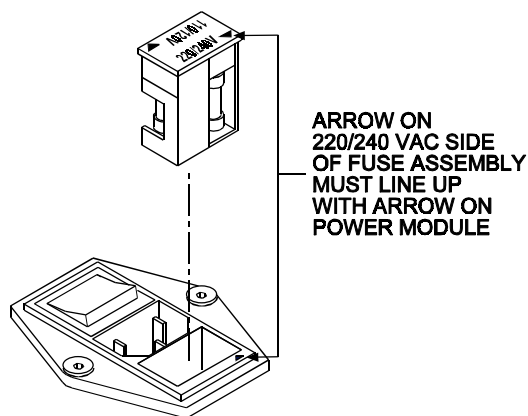
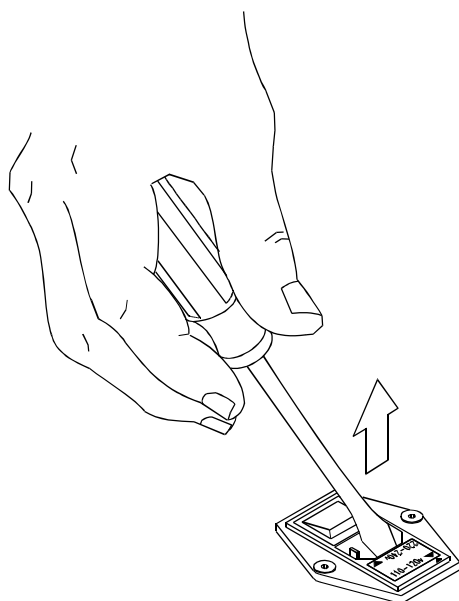
Disconnect the power cord before servicing the power module.

Pop the fuse assembly up and out of the power module with a flat head screwdriver.

Once out of the power module, turn the fuse assembly so that the arrow on the 220/240VAC side of the assembly is lined up with the arrow on the power module.

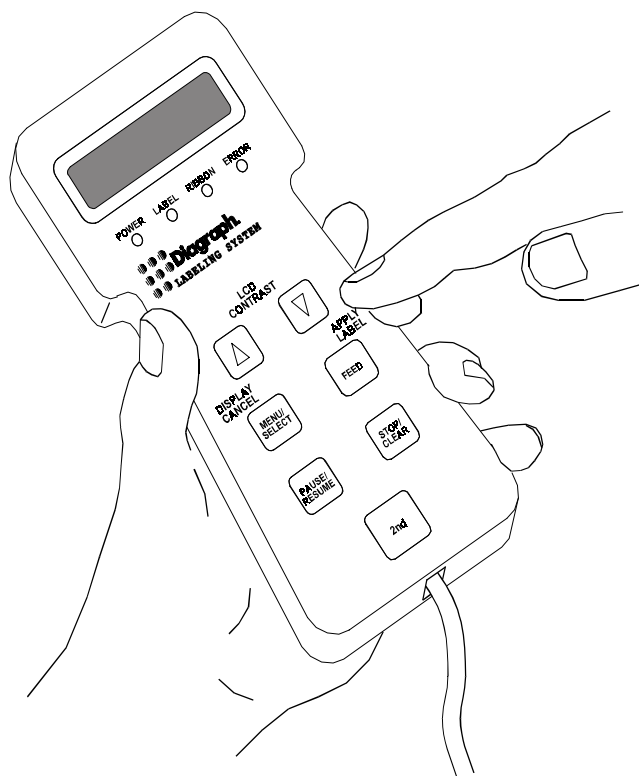
Replace the fuse assembly.

See Fuse Replacement Kit Instructions 6105-404N when needing to replace a fuse.



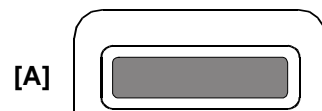
## 5.2 Hand-Held Terminal Configuration

The Hand-Held Terminal for the PA/4000 is designed for industrial environments. It controls applicator functions that print and apply labels. It features a one-line sixteen character text LCD display, four LED lights that show power on and warn of error conditions and seven control keys that are described below. It sits in its holster attached to the yoke when not in use.



### LCD (Liquid Crystal Display) Menu Window [A]

The LCD menu window displays one-line of text allowing up to sixteen characters. It displays menu items (see [D]) or error conditions. "All OK" screen display means the system is printing normally.



### LEDs [B]

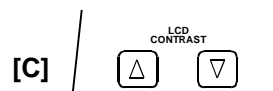
Four LEDs signal a condition (while the LCD displays the condition, see [A]):



- *Power LED ON* signals all systems go, OFF indicates no power
- *Label LED FLASHING* indicates Label Low
- *Ribbon LED FLASHING* indicates Ribbon Low or Ribbon Out
- *Error LED ON* indicates Ribbon Out, *FLASHING* indicates Printer Paused, Cylinder Error or Printer Error

## LCD Contrast or Scroll Keys [C]

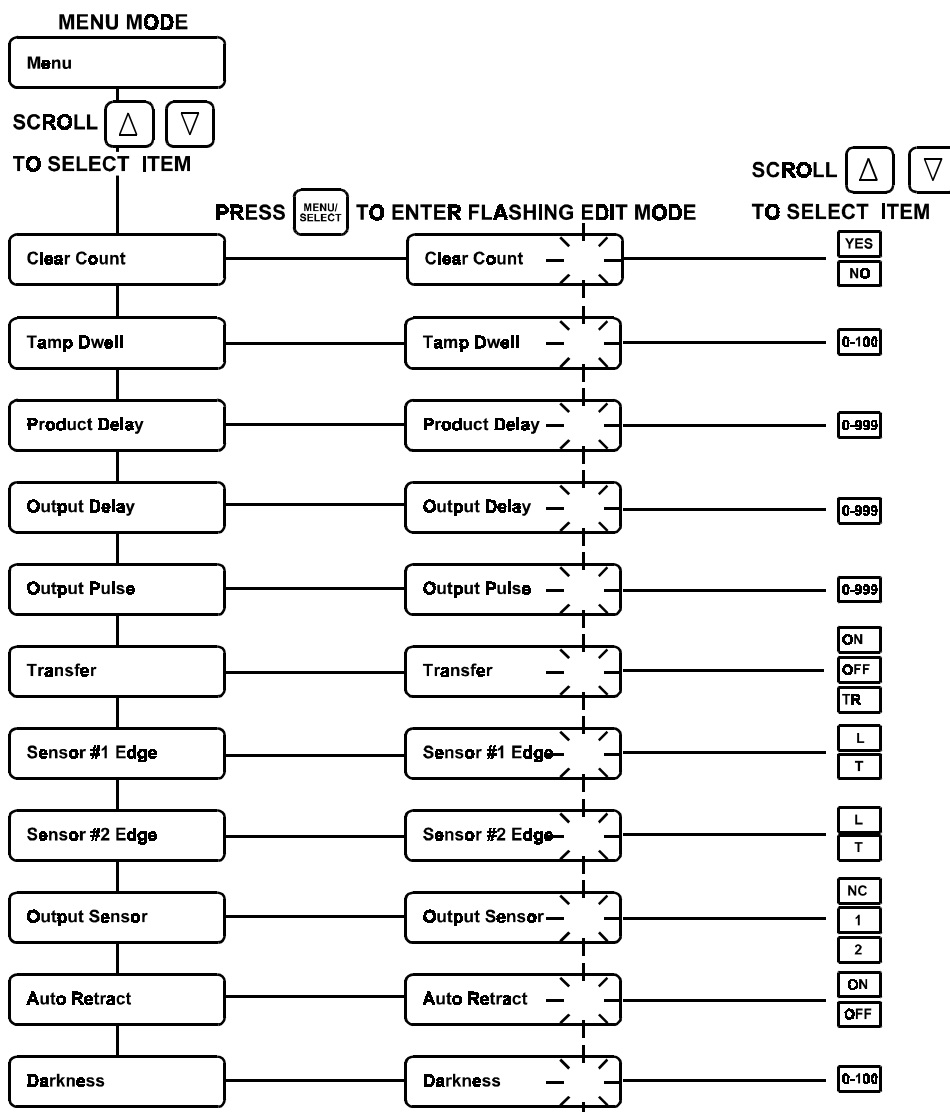
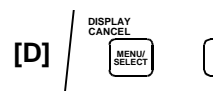
Hold the 2<sup>nd</sup> key down while pressing the up or down arrow keys to control LCD Display contrast. Up key to increase contrast, down key to decrease contrast.



These keys are also used to scroll through menu items as discussed in [D].

## Menu/Select or Display/Cancel Key [D]

This key is used to toggle between Menu mode and Edit mode.



PRESS TO ACCEPT

PRESS + TO CANCEL  
THE MENU ITEMS WILL EXIT  
EDIT MODE AND STOP FLASHING

Review the current count (by pressing and holding the 2<sup>nd</sup> key followed by the MENU/SELECT key once).

See error messages (by pressing and holding the 2<sup>nd</sup> key followed by the MENU/SELECT key twice).

Within the MENU screen are menu select items that control the settings to print and apply labels. When the PA/4000 is turned ON the screen will display "ALL OK". Press the MENU/SELECT key to see the menu screen. From this screen use the arrow keys to scroll through the menu select items as shown in the chart above.

To edit a menu item press the MENU/SELECT key. The menu item will begin flashing. Use the arrow keys to scroll to the correct edit and press the MENU/SELECT key to accept the change, then exit the edit mode. If you make a mistake while in edit mode, hold the 2<sup>nd</sup> key while display is flashing and press the MENU/SELECT key to cancel.

### Definitions of Menu Select Items:

**Clear Count** – Resets the "applied label" counter to zero.

**Tamp Dwell** – Adjusts the amount of time that the tamp pad stays extended before retracting to home position. Adjust from 0-100. The tamp dwell time must be set greater than 30 ms to extend the cylinder.

**Product Delay** – Adjusts the input delay of photosensor 1 causing the tamp pad to delay before extending to apply a label. Adjust from 0-999.

**Output Delay** – Adjusts the amount of time an external device like the PA/4000 secondary wipe-down unit delays before it triggers. Adjust from 0-999.

**Output Pulse** - Adjusts the width of the output pulse used to trigger an external device like the PA/4000 secondary wipe-down unit. Adjust from 0-999. Must be set above 25, with a setting of 25 or lower the secondary wipe-down won't fire.

**Transfer** – Sets the system for use with direct thermal or thermal transfer ribbon.

**OFF** for direct thermal label printing.

**ON** for thermal transfer printing using a black ribbon. Ribbon sensor is enabled and head current temperature is reduced.

**TR** for thermal transfer printing using a translucent ribbon.\*

\* Requires ribbons with an opaque trailer.

**Sensor #1 Edge** – Sensed by Photosensor 1, it determines whether the system delay(s) will trigger at the front "L" (called leading edge) or the end "T" (called trailing edge) of a box.

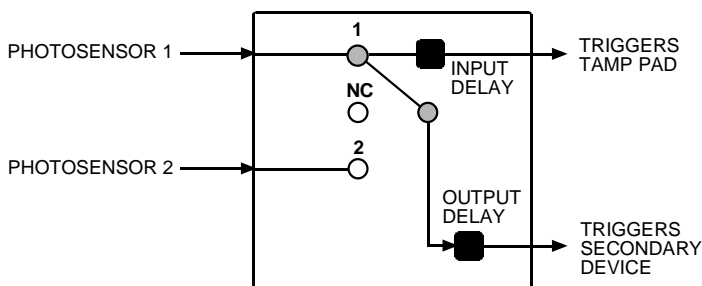
**Sensor #2 Edge** – Sensed by Photosensor 2, it determines whether the output delay will trigger the secondary wipe-down unit at the front "L" (called leading edge) or the end "T" (called trailing edge) of a box.

**Output Sensor**– Determines whether the Output Pulse will be sent through either **Photosensor 1**, **Photosensor 2** or make **No Connection**. Choose 1, 2, or NC.



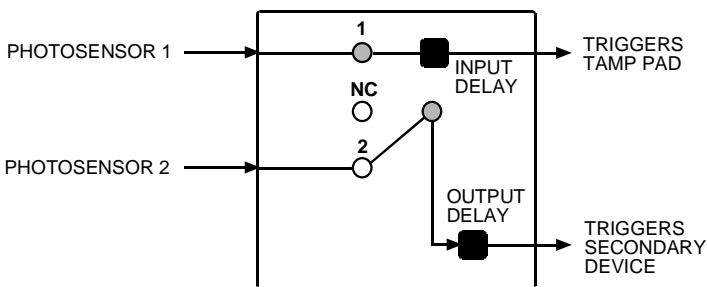
### Output Sensor Set to Photosensor 1

With the output sensor set to 1 the output pulse will be sent through photosensor 1. The drawing below shows the input signal from Photosensor 1 coming into the PA/4000 triggering the tamp pad, and with the same signal triggering a secondary device (both using the same edge of the product, leading or trailing).



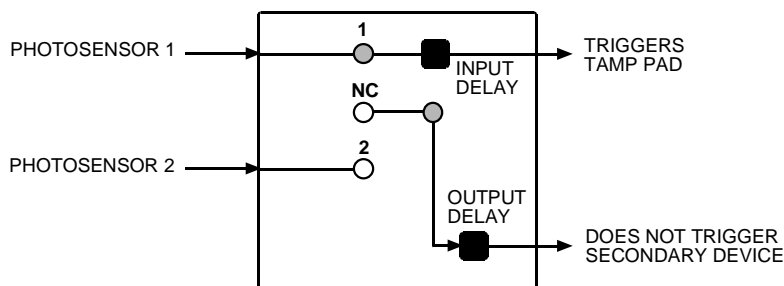
### Output Sensor Set to Photosensor 2

In a special situation where the same edge cannot be used, you will need to use two photosensors. With the output sensor set to 2, photosensor 1 will trigger the tamp pad while photosensor 2 triggers a secondary device. The output pulse will be sent through photosensor 2. The drawing below shows the photosensor input signals of both photosensors 1 and 2 entering the PA/4000.



### Output Sensor Set to No Connection

In the case where you don't want the secondary device to be triggered, set the output sensor to NC (NO CONNECT). As shown below, Photosensor 1 will trigger the tamp pad but the system sends no output pulse signal to a secondary device.



**Auto-Retract** - Enables or Disables the Auto-Retract feature of the PA/4000. The Auto-Retract sensor is located on the tamp pad. It senses the product when the tamp pad extends to apply a label, then commands the tamp pad to retract to the home position. If the sensor does not detect a product, or if the sensor is turned OFF from the Hand-Held Terminal, the cylinder will remain in the extended position until the TAMP DWELL time has expired.

**Darkness** - Adjusts the level of darkness (printhead temperature) in a printhead. It is used to balance a new printhead so that it prints at the same level of darkness as the previous head. Darkness values are from 1 to 99. Start with a midrange number and work from there.

### Feed (Apply Label) [E]

Provided there is not a label present on the tamp pad already, the FEED key will advance the paper automatically to the first print position of the next label. On a new size label, two labels are usually fed before registration occurs. Pressing the FEED key in conjunction with the 2nd key will cause the system to apply a label.



**NOTE:** The tamp assembly will not cycle unless a label is present on the tamp pad.

### Pause/Resume [F]

The PAUSE/RESUME key allows you to pause the printing of a run of labels. A second depression of the key will resume the job. Activation of this key will do the following:



- Stop the print mechanism when the label being printed is completed
- Stop the label counter, but maintain the count balance
- Hold all data in memory
- Disable tamp applicators and disable photosensor out signal



**NOTE:** On the PA/4020 model, the disabling of the photosensor out signal will in turn prevent the secondary wipe-down from being activated by photosensor 1 or 2.

Stop/Clear [G]

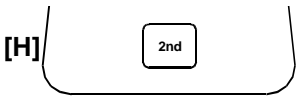
The STOP/CLEAR key deletes the current print job from the PA/4000's memory. If you press the STOP/CLEAR key twice, you will clear two print jobs from the PA/4000's memory. Once you press this key, you must press the PAUSE/RESUME key to resume printing.








**NOTE:** Pressing the STOP/CLEAR key will NOT clear any PA/4000 Error conditions.

2nd Key [H]

The 2nd key works like the shift key on a PC keyboard. Holding the 2nd key down while pressing another key accesses new functions eliminating the need for more keys on the keypad. The chart below shows all the functions that can be accessed with 2nd key.



Hold  Key then:

Press	Function Accessed
 or 	Controlls contrast
Press Once 	Review current count
Press Twice 	See error messages
	Apply a label

### 5.2.1 Error or Indications Menu

The Error Menu indicates problems the system is currently experiencing. An error messages will appear on the Hand-Held Terminal display screen. When the red Error LED lights on the hand-held terminal, you will need to check the Error Menu by holding down the 2nd key and pressing the MENU/SELECT key twice.

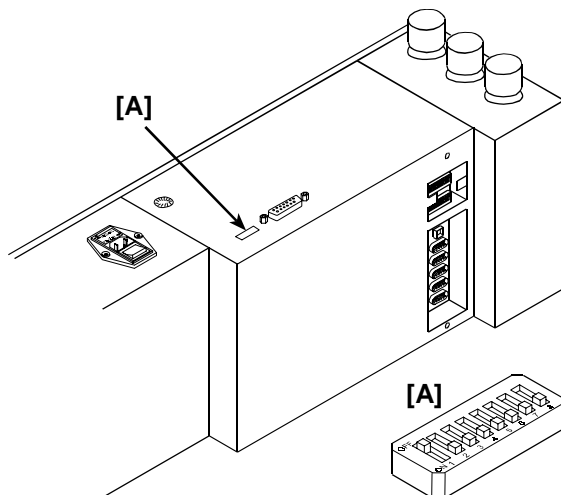
There are five possible error messages that could appear on the LDC display screen:

- Ribbon Out - When the ribbon in the printer is completely depleted, the RIBBON LED will flash and the ERROR LED will stay lit. Replace the ribbon, clear the error and resume printing.
- Ribbon Low - The ribbon in the printer is nearly depleted and should be changed soon. The RIBBON LED will flash when this occurs.
- Label Low - The label stock in the printer is nearly depleted and should be changed soon. The LABEL LED will flash when this occurs.
- Printer Error - Whenever a mechanical problem has interrupted printing, the ERROR LED and LABEL LED will flash.
- Printer Paused - The Printer Paused error message will appear if either of the following occurs: The PAUSE switch is pressed or a print job is canceled with the STOP/CLEAR key.

To clear an error in the printer, press PAUSE, FEED and then PAUSE again to resume operation.

## 5.3 Configuring the DIP Switch Settings

The eight position DIP Switch block labeled SWS1 **[A]** is located on top of the PA/4000 main unit next to the RS-232 connector. Switches 1, 2 and 3 control the baud rate while switches 4-8 control printer features such as word length, compatibility, present sensor, ribbon sensor and cutter enable. Refer to the chart below.



When operating the PA/4000, this switch should be set to OFF.

When operating the PA/4000, this switch should be set to ON.

When operating the PA/4000, this switch should be set to OFF.

When operating the PA/4000, this switch should be set to ON.

Baud Rate	SW1-1	SW1-2	SW1-3
9600	OFF	OFF	OFF
4800	OFF	OFF	ON
2400	OFF	ON	OFF
1200	OFF	ON	ON
600	ON	OFF	OFF
300	ON	OFF	ON
19200	ON	ON	OFF
TEST	ON	ON	ON
Word Length		SW1-4	
8, 1, N-Bit Word		OFF	
7, 2, N-Bit Word		ON	
Compatibility		SW1-5	
Prodigy Plus Offset		OFF	
Prodigy Offset		ON	
Present Sensor		SW1-6	
Disable Sensor		OFF	
Enable		ON	
Ribbon Sensor		SW1-7	
Standard Sensing		OFF	
Inverted Sensing (Colored and Special Ribbons)		ON	
Cutter Enable		SW1-8	
Remote Cut Enabled		ON	
Remote Cut Disabled		OFF	

If you have the labeling software *Performances Series for Windows™* recommended by Diagraph, you can set switches 4 through 8 through it.

### 5.3.1 Setting the Baud Rate

Switches 1, 2 and 3 control the PA/4000's baud rate. Before you can send printed labels to the PA/4000, you need to set the baud rate. The chart above gives the position of the three switches and the corresponding baud rate for each setting. Set your switches according to your baud rate.

### 5.3.2 Setting Other Printer Features

The PA/4000 can accept 7 or 8 bit data, while ignoring parity. It also requires at least 1 stop bit. This configuration assures the greatest compatibility with most serial devices, even if the data format arrangement of the host cannot be modified. Set these features manually unless you have Diagraph's ***Performance Series for Windows™*** software (these settings can be set from inside the software).

#### **SW1-4 Word Length**

Switch SW1-4, selects the word length.

##### SW-4

7-BIT WORD ON

8-BIT WORD OFF

#### **SW1-5 Compatibility**

Switch SW1-5 emulates a standard PRODIGY PRINTER. When operating the PA/4000, this switch should be set to OFF.

##### SW1-5

Emulate Prodigy ON

PA/4000 OFF

#### **SW1-6 Present Sensor**

Switch SW1-6 enables the label present sensor. Setting this switch to the ON position enables the sensor. Setting this switch to the OFF position disables the sensor.

##### SW1-6

Enable sensor ON NOTE: This switch must be ON!

Disable sensor OFF

#### **SW1-7 Ribbon Sensor**

This switch is always OFF for PA/4000. This switch enables inverse ribbon sensor logic, which is used for colored ribbons only.

##### SW1-7

Enable ON

Disable OFF\*

*\*Must be turned OFF even when translucent (colored) ribbon is used.*

#### **SW1-8 Cutter Enable**

This switch controls the cutter function.

##### SW1-8

Enable Cutter ON (switch should be left ON)

Disable Cutter OFF

NOTE: To read the switch settings, the printer must be reset by turning it off and back on.

## 5.4 Configuring the Air Cylinder/Tamp Pad

This section assumes that you have already made all electrical and air pressure connections and that a label has been sent to the PA/4000 from an outside source; ie: a PC with *Performance Series for Windows™* Labeling Software.

You will be manually configuring the air flow controls on the air cylinder/tamp pad to control the force at which the tamp pad is extended and retracted. You will also be setting various menu select items using the Hand-Held Terminal to tell the tamp pad when to extend in order to effectively apply a label to the product and how long the tamp pad will wait before it retracts to the home position.

### Preparation

Make sure the conveyor isn't moving and the air is turned off (OSHA shut-off valve is in the closed position). Position the PA/4000 next to the conveyor in the orientation used for production. Power ON the system. Press the PAUSE/RESUME key on the Hand-Held Terminal to pause the system.

### 5.4.1 Configuring the Air Flow on the Air Cylinder/Tamp pad

The air flow controls **[B]** and **[C]** on the cylinder/tamp pad control the air pressure needed to cause the tamp to extend and retract fully and with the appropriate force. Record these final settings on the PA/4000 Configuration Sheet attached to the PA/4000 (See Section 6). Make sure the cylinder/tamp pad assembly is properly mounted to the extended horizontal support bar and the tamp pad is properly positioned with the peel blade as shown in Section 4.4.2.

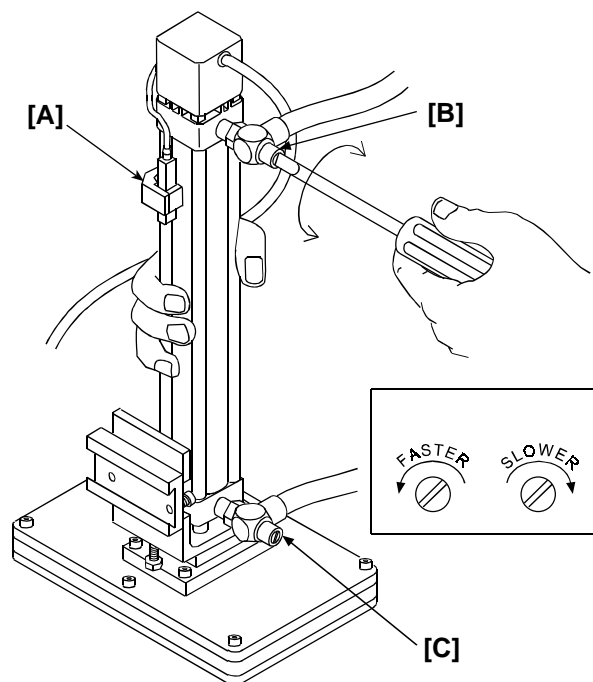
#### 1. Manually retract the tamp pad.

Ensure the cylinder home switch **[A]** LED is lit when the cylinder is fully retracted. If not, adjust the position of the sensor by loosening the set screws and moving the sensor up or down until the LED comes on. Retighten the set screws.

#### 2. Make sure both the top (retract) **[B]** and bottom (extend) **[C]** Air Flow Controls are turned fully counterclockwise.

#### 3. Place a test product on the conveyor in the stroke path of the tamp pad just as it will be applying in normal production.

#### 4. Make sure the tamp pad is parallel to the product. Manually extend the tamp cylinder until the tamp pad contacts the products surface. If the tamp pad is not completely parallel to the surface of the product, retract the tamp pad slightly, loosen the yoke bolt **[D]** on the



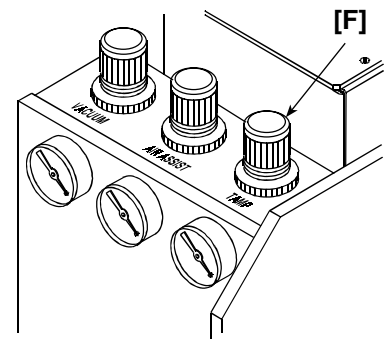
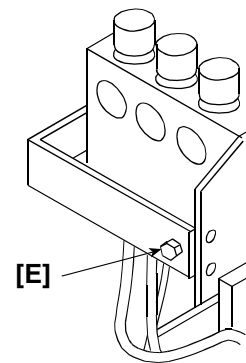
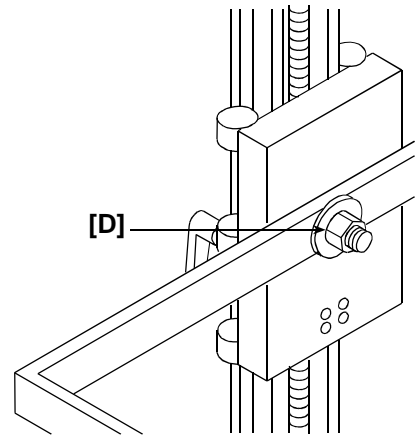
mounting plate and adjust the yoke until it is level and retighten the bolt. Then loosen the yoke bolts **[E]** holding the main unit and adjust the main unit until it is level and retighten the bolts. This will make the tamp pad completely parallel to the product surface.

5. For now, move the test product out of the path of the tamp pad but keep it nearby. With the tamp pad fully extended, slowly turn the crank handle on the stand to lower the PA/4000 until the tamp pad extends about 1 inch past the surface of the product.
6. Manually return the tamp pad to the cylinder's fully retracted position and turn ON the air supply. To begin with, adjust the tamp air pressure **[F]** to 25 psi (between 20-40 psi is the usual range).



**CAUTION:** DO NOT PLACE YOUR HAND BETWEEN THE PA/4000 MAIN UNIT AND THE TAMP PAD.

7. Press PAUSE-RESUME on the Hand-Held to resume the air cylinder/tamp pad action. This triggers the cylinder/tamp pad to cycle. Adjust the psi until the tamp pad appears to extend equal to the surface of the test product. Replace the test product back into the path of the tamp pad. Notice the force the tamp pad extends and retracts.
8. Press PAUSE-RESUME again to pause the cycling action. To attain the proper force of the air cylinder/tamp pad extension and retraction, adjust the top **[B]** and bottom **[C]** air flow controls by turning clockwise one full turn at a time. Count how many full turns are made to get the right amount of force necessary considering the product, label size, etc. Record the turns on the PA/4000 Configuration Sheet (see Section 6). You may have to readjust the tamp air pressure **[F]** to get the correct amount of air pressure. When you are satisfied with the psi and air flow settings, go to the next section on setting the tamp dwell.





### 5.4.2 Setting the Tamp Dwell with the Hand-Held Terminal

The Tamp Dwell Menu Select Item on the Hand-Held Terminal adjusts the amount of time that the cylinder waits before returning to its home position.

A lower Tamp Dwell value setting will reduce the time that the cylinder waits and because the cylinder extension time is shorter, the cylinder's stroke may be shorter.

To set the Tamp Dwell value:

1. Turn on the air by sliding the OSHA shut-off valve to the ON position.
2. Using the Hand-Held terminal, turn off the auto-retract.
3. On the Hand-Held Terminal press the MENU/SELECT key.
4. From the Menu screen, press the down arrow key twice until the display shows the Tamp Dwell screen.
5. Observe the current Tamp Dwell value by pressing the MENU/SELECT key to enter the Edit mode (the value will flash). To begin with, set the Tamp Dwell value to 30. Note: A six inch cylinder with a three inch tamp distance at 40 PSI completes its cycle in about 0.235 seconds. Tamp cycle times are dependant on air flow control, tamp air pressure psi and photosensor distance. Note the air flow control instructions in Section 5.4.1. Tamp Dwell settings and cycle time times for the PA/4000 are in the following chart:
6. Press the MENU/SELECT key to save the new value. The value you enter will not be used until the MENU/SELECT key is pressed and the display is no longer flashing. Hold the 2nd key and press the MENU/SELECT key while the display is still flashing to CANCEL.
7. Observe how far the cylinder extends before it retracts. Use the arrow keys to increase the DWELL value so that the cylinder extends but does not reach the product. Turn on the conveyor. Adjust the Tamp Dwell setting until labels are reliably applied to every product. Record the final dwell value on the PA/4000 Configuration Sheet. See Section 6.

Tamp Dwell Setting	Complete Cycle Time in Seconds
10	0.13
20	0.26
30	0.39
40	0.52
50	0.65
60	0.78
70	0.91
80	1.04
90	1.17
100	1.30



**NOTE:** Do not set the Tamp Dwell value any longer than the time required for full tamp cylinder extension.

### 5.4.3 Setting the Tamp Dwell with Auto-Retract ON

When configuring a PA/4000 system using auto-retract, set the tamp dwell value as low as you can with no missed products. Note the air flow control and psi setting instructions in Section 5.4.1. The auto-retract sensor cannot detect an object farther away than ¼-inch.

To find the correct tamp dwell setting (assuming normal operating conditions):

- Determine the maximum distance the tamp pad will extend to the product.
- Increase the tamp dwell setting until the tamp pad extends to the maximum distance and reliably applies labels to all products (with no missed products).



**NOTE:** Following this procedure will minimize the possibility of damage to the PA/4000 or the product if the auto-retract does not detect the product.

### 5.4.4 Setting the Product Delay with the Hand-Held Terminal

The product (input) delay value controls the amount of time after the photosensor senses a product that the tamp pad delays before it extends to apply a label to that product. The possible product delay settings are from 0 to 999. A product delay value of 0 will cause the tamp pad to extend as soon as the photocell sees a product. Setting the product delay too low will cause the tamp pad to extend before the product arrives, which could cause the product to accidentally strike and damage the air cylinder/ tamp pad assembly. Typical product delay settings range anywhere from 300-700 .

As products pass in front of the photosensor, the tamp pad will extend and apply a label to the product. The product delay value will control exactly where on the product the label is applied. The product delay time should be set so that the tamp pad extends when the area of the product where the label should be arrives at the tamp assembly. The following table gives delay values and their corresponding times (in milliseconds).

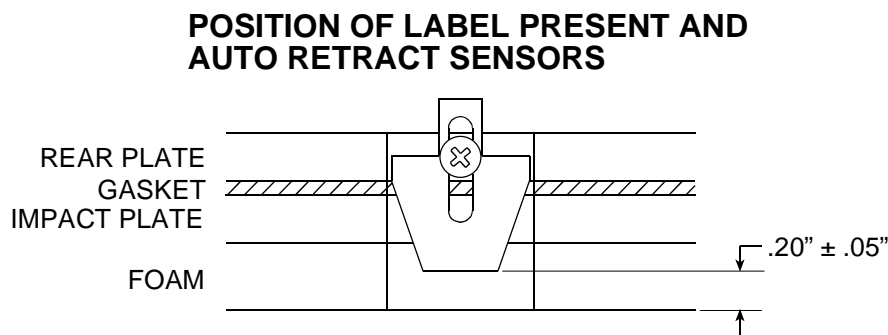
DELAY	TIME (MILLISECONDS)
0	72.2
5	90.4
10	111.5
25	170.9
50	277.9
75	376.9
100	479.2
150	681.7
200	884.4
250	1095.7
300	1300
350	1497.8
400	1708.7
450	1911
500	2116.3
550	2321.3
600	2523.8
650	2736.8
700	2939.3
750	3140.1
800	3344.9
850	3548.0
900	3758.4
950	3962.5
999	4160.4

To set the Product Delay value:

1. Start the conveyor.
2. Take the PA/4000 out of pause mode by pressing the PAUSE/RESUME key on the Hand-Held terminal.
3. From the Menu screen, press the down arrow key three times.
4. The display shows the Product Delay screen.
5. Press the MENU/SELECT key to enter Edit mode (the value will flash).
6. Use the arrow keys to increase or decrease the Product Delay value.
7. Press the MENU/SELECT key to accept the changes. The value entered will not be used until the MENU/SELECT key is pressed and the display is no longer flashing.
8. Hold the 2nd key and press the MENU/SELECT key (while the display is still flashing to CANCEL).
9. Repeat this process until the label is applied where you want it on the product.

#### 5.4.5 Setting the Position of the Label Present and Auto-Retract Sensors

The tamp pad assemblies for labels 4 inches long and greater will have more than one location available for mounting the auto-retract sensor. The choice of which location to use will depend on the direction of the product and whether the label is being applied to the leading or trailing edge of the product. The auto-retract sensor should be located in a position that will be towards the inside of the product so that it can be assured of sensing the product regardless of any changes in line speed. The bottom of the label present and auto-retract sensors should initially be set to 0.20 inches from the bottom of the tamp pad. If necessary the sensors can be moved up or down 0.05 inches to detect certain labels or products.



## 5.5 Example Job Setup

The following section shows an example job setup based on PA/4010.



**NOTE:** Move the PA/4000 away from the line until your Hand-Held Terminal settings are correct.

**STEP 1:** After system installation and configuration, check for any errors. If the system is operating normally, the screen will display ALL OK.

**STEP 2: Go to the Menu screen.**

Press the MENU/SELECT key or the down arrow key. This will take you to the Menu screen.

**STEP 3: Clear the Item Count.**

- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter a Clear Count response of YES or NO.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: While the display is still flashing, press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 4: Set the Tamp Dwell value.**

- From the Clear Count screen, press the down arrow key once.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- For example, use the arrow keys to enter a Tamp Dwell value of 80.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: While the display is still flashing, press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 5: Set the Product Delay.**

- From the Tamp Dwell screen, press the down arrow key once.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter a Product Delay In value of 100.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: Press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 6: Set the Output Delay .**

- From the Product Delay screen, press the down arrow key once.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter an Output Delay value of 0.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: Press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 7: Set the Transfer.**

- From the Output Delay screen, press the down arrow key twice.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter a Transfer value of OFF.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: Press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 8: Set the Sensor #1 Edge.**

- From the Transfer screen, press the down arrow key once.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter a Sensor #1 Edge value of L for *leading edge* (we use leading edge because we want to place a label on the front edge of the box.)
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: Press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 9: Set the Output Sensor.**

- From the Sensor #1 Edge screen, press the down arrow key twice.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter an Output Sensor value of NC for *no connect*.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: Press and hold the 2nd key followed by the MENU/SELECT key.

**STEP 10: Set the Darkness.**

- From the Output Sensor screen, press the down arrow key twice.
- Press the MENU/SELECT key once to enter edit (flashing) mode.
- Use the arrow keys to enter a Darkness value of 25.
- TO ACCEPT CHANGES: Press the MENU/SELECT key.
- TO CANCEL: Press and hold the 2nd key followed by the MENU/SELECT key.

## 6.0 OPERATIONS

### 6.1 Start of the Day

#### **Step 1 – Check Configuration.**

Look at the configuration sheet attached to the PA/4000 (see page 3 of this section). Check all system settings against those recorded on the sheet.

#### **Step 2 – Check Power.**

1. Check that the OSHA air valve is in the CLOSED position.
2. Turn ON the power.
3. Check the air pressure.
4. Check the positions of all switches.

#### **Step 3 – Check Consumables.**

1. Check that there is a label roll loaded. Make sure that it is routed correctly. See Section 4.13.
2. Check that there is a ribbon roll loaded. Make sure that it is intact and routed correctly through the print engine. See Section 4.14.

#### **Step 4 – Start Up.**

1. If there are no problems or errors, the Hand-Held Terminal will display "All OK".
2. Press the PAUSE/RESUME key once. The display will read "Printer Paused".
3. Slide the air shut-off valve to the OPEN position.

#### **Step 5 – Download Format.**

1. At the PC send a batch of labels to the PA/4000.
2. Press the PAUSE/RESUME key once to enter print mode.
3. Note that the printer will expel two more labels after you expel the first label. Remove these labels and send one more test label to be sure that the PA/4000 is ready.

#### **Step 6 – Turn on Conveyor.**



# PA/4000 CONFIGURATION SHEET

Serial No. \_\_\_\_\_

Production Line \_\_\_\_\_

**THESE VALUES SHOULD ONLY BE CHANGED BY MAINTENANCE OR OTHER TRAINED PERSONNEL**

## HAND HELD MENU SETTINGS

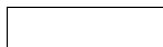
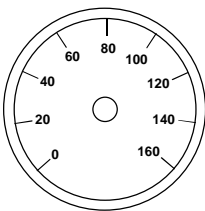
The values recorded on this sheet will be different from one production line to the next. Factors such as line speed, distance from the PA4000 tamp pad to the product, and the location of the product sensor will determine the actual values.

Menu	Product Delay** _____	Transfer <input type="checkbox"/> ON <input type="checkbox"/> OFF	Output Sensor <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> NC
▲ ▼	Output Delay** _____	Sensor #1 Edge <input type="checkbox"/> L <input type="checkbox"/> T	Auto Retract <input type="checkbox"/> ON <input type="checkbox"/> OFF
Clear Count* NO	Output pulse** _____	Sensor #2 Edge <input type="checkbox"/> L <input type="checkbox"/> T	Darkness _____
Tamp Dwell** _____			

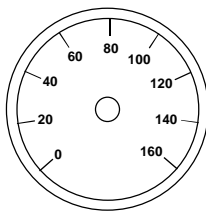
\* Not a stored variable

\*\*Line speed, tamp distance and other factors will determine actual value.

## AIR CONTROL PSI SETTINGS

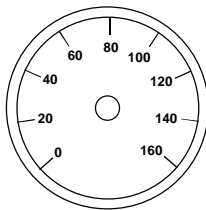


VACUUM



AIR ASSIST

Draw in a line to represent the needle position and/or write in the box an approximate numeric value.

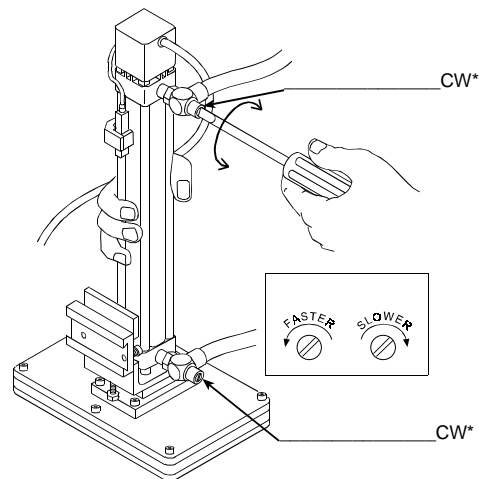


TAMP

REVISION 2.0 3/17/00

## TAMP CYLINDER FLOW CONTROLS

See Section 5.4.1 for instructions on how to set air flow controls. After air flow has been adjusted, record here as a reference how many full turns clockwise was made to attain the final settings. Once set, do not change these settings.



\*Number of turns clockwise relative to fully ccw position



## 6.2 Adjustments during Operation

**Print Quality** PA/4000 Print engine has adjustments for controlling the quality of print on the labels. Two of most important adjustments are print darkness (printhead temperature) and print speed.

If you are using *Performance Series for Windows™* software, review chapter 5 on Printing Formats in the *Performance Series User's Manual* to achieve the best contrast in print.

If your message contains bar codes, use a bar code verifier to adjust for optimum print quality.

## 6.3 Stopping Label Application

Stop the unit by pressing the STOP/CLEAR key on the Hand-Held Terminal.

## 6.4 End of the Day

### **Step 1 – Stop Label Application.**

Press STOP/CLEAR key on the Hand-Held Terminal.

### **Step 2 – Stop the Conveyor.**

### **Step 3 – Power OFF the PA/4000.**

### **Step 4 – Slide the air shut-off valve to the CLOSED position.**

Do not close the air shut-off valve before shutting off the conveyor. The air cylinder/tamp pad assembly could fall and damage a product.

### **Step 5 – Clear the Label off the Tamp Pad.**

### **Step 6 – Clean the Sensors.**

If available, use compressed air to clean the sensors. Wiping the sensors to clean them is not nearly as effective as an air gun.

## 7.0 Prodigy Plus™ Internal Fonts and Bar Code Examples

This section describes all character fonts and bar codes internally available in the Prodigy Plus™ print engine.

### 7.1 Explanation of Fonts and Bar Codes

All character fonts and bar codes available in the Prodigy Plus™ print engine are illustrated on the following pages. Each character font and bar code has a "name" associated with it for use in programming. Character fonts have been given numeric names while bar code fonts are selected by alpha names. Bar code fonts in uppercase alpha names will print bar codes with human readable interpretations. Bar code fonts in lowercase alpha names will be the same codes printed as bars only.

Bar code human readable fonts use the slash zero convention for distinguishing between the zero and the alphabetic O.

Character Fonts 0, 1 and 2 include the upper and lowercase ASCII characters, which include commonly used international characters. Character Font 9 is the CG Triumvirate smooth font. Point sizes are 6, 8, 10, 12, 14, 18, 24, 30, 36 and 48.

#### 7.1.1 Eight Standard Character Fonts (203 dots/inch)

CPI at 1, 2 & 3X Dot Pattern Rotations DPI				Prodigy Plus Print Engine			Prodigy Plus 152 Print Engine		
Dot Size				1x1 All Rot 200	2x2 All Rot 100	2x3 All Rot 2 & 4	1x1 All Rot 153.8	2x2 All Rot 76.3	2x3 Rot 2 & 4 51.3
Font	Dot H	Dot W	Dot Sp	0.005	0.010	0.015	0.0065	0.0130	0.0195
0	7	5	1	33.83	16.92	11.28	25.64	12.82	8.55
1	13	7	2	22.56	11.28	7.52	17.09	8.55	5.70
2	18	10	2	16.92	8.46	5.64	12.82	6.41	4.27
3	27	14	2	12.69	6.34	4.23	9.62	4.81	3.21
4	36	18	3	9.67	4.83	3.22	7.33	3.66	2.44
5	52	18	3	9.67	4.83	3.22	7.33	3.66	2.44
6	64	32	4	5.64	2.82	1.88	4.27	2.14	1.42
7	32	15	5	10.15	5.08	3.38	7.69	3.85	2.56
8	28	15	5	10.15	5.08	3.38	7.69	3.85	2.56

## 7.1.2 Bar Codes

### Ratio Based Bar Codes with Human Readable fonts (UPPERCASE)

Prodigy Plus (actualDPI-203)						
Ratio	2:1	5:2	3:1	2:1	5:2	3:1
Narrow BarName	0.005	0.005	0.005	0.010	0.010	0.010
A 30 F9	15.62	7	12.69	7.81	3.5	6.34
D 120 F5	14.5	6.34	11.28	7.25	3.17	6.64
H HIBC	15.62	7	12.69	7.81	3.5	6.34
I CODABAR	14.5	6.34	11.28	7.25	3.17	5.64
J 120 F5W /BARS	16.92	7.25	12.69	8.46	3.63	6.34
K PLESSEY	20.3	9.23	16.92	10.15	4.61	8.46
L UPC CASE	14.5	6.34	11.28	7.25	3.17	5.64
Prodigy Plus 152 (actualDPI-153.8)						
Ratio	2:1	5:2	3:1	2:1	5:2	3:1
Narrow BarName	0.006	0.006	0.006	0.0130	0.0130	0.0130
A 30 F9	11.83	5.31	9.62	5.92	2.65	4.81
D 120 F5	10.99	4.81	8.55	5.49	2.40	4.27
H HIBC	11.83	5.31	9.62	5.92	2.65	4.81
I CODABAR	10.99	4.81	8.55	5.49	2.40	4.27
J 120 F5W /BARS	12.82	5.49	9.62	6.41	2.75	4.81
K PLESSEY	15.38	6.99	12.82	7.69	3.50	6.41
L UPC CASE	10.99	4.81	8.55	5.49	2.40	4.27

### Element Based Bar Codes

Prodigy Plus (actualDPI-203)						
Multiplier	1	2	3	4	6	8
Narrow BarWidth	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049
B UPC-A	38%	76%	114%	152%	227%	303%
C UPC-E	38%	76%	114%	152%	227%	303%
E CODE128 (B)	9.23	3.69	6.15	4.61	1.85	3.08
F EAN-13	38%	76%	114%	152%	227%	303%
G EAN-8	38%	76%	114%	152%	227%	303%
M UPC 2D IG ADD	38%	76%	114%	152%	227%	303%
N UPC 5D IG ADD	38%	76%	114%	152%	227%	303%
O CODE93	11.28	4.51	7.52	5.64	2.26	3.76
Prodigy Plus 152 (actualDPI-153.8)						
Multiplier	1	2	3	4	6	8
Narrow BarWidth	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
B UPC-A	50%	100%	150%	200%	300%	400%
C UPC-E	50%	100%	150%	200%	300%	400%
E CODE128 (B)	6.99	2.8	4.66	3.5	1.40	2.33
F EAN-13	50%	100%	150%	200%	300%	400%
G EAN-8	50%	100%	150%	200%	300%	400%
M UPC 2D IG ADD	50%	100%	150%	200%	300%	400%
N UPC 5D IG ADD	50%	100%	150%	200%	300%	400%
O CODE93	8.55	3.42	5.70	4.27	1.71	2.85

## 7.2 Internal Font Examples

These font examples are of all nine Prodigy Plus™ standard internal fonts. They are numerically named. All examples are printed with a 10 x 10 mil pixel size, and a 1x magnification on the horizontal and vertical dot patterns.

**Font 0**

Identifies a 96-character alphanumeric font. Uppercase and lowercase. Characters are 7 dots high, 5 dots wide, and 1 dot spacing.

Prodigy Plus

---

---

Prodigy Plus 152

```
1 "##%'(<)*+,-./
@123456789:;<=?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^~
`abcdefg hijklmno
PQRSTUVWXYZ{ }~`
```

```
!"#$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
`abcdef9hijklmno
Pqrstuvwxyz<|>~`
```

## Font 1

Identifies a 145-character uppercase and lowercase alphanumeric font that includes descenders and ascenders. Characters are 9 dots high, 9 dots wide, and 2 dots spacing (International characters are 13 dots high, 7 dots wide, and 2 dots spacing).

Prodigy PlusProdigy Plus 152

!"#\$%&'()\*+,-./  
0123456789:;<=>?  
@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\]^\_  
`abcdefghijklmno  
pqrstuvwxyz{|}~  
ÿüäåäääçêëèëîïñ  
Éæffôôôûûûöüøð×  
áíóúñññ&©-½¼¡«»  
ß

!"#\$%&'()\*+,-./  
0123456789:;<=>?  
@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\]^\_  
`abcdefghijklmnopqrstuvwxyz  
pqrstuvwxyz{|}~  
ÇüéääàâçéèëïîËÄ  
Éæſôöùûüöøƒø×ƒ  
áíóúñÑ&º¿⊙-¼½¾«»ß

## Font 2

Identifies a 138-character alphanumeric upper and lowercase font. Characters are 18 dots high, 10 dots wide, and 2 dots spacing.

### Prodigy Plus

!"#\$%&'()\*+,-./  
0123456789:;<=>?  
@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\]  
'abcdefghijklmnop  
pqrstuvwxyz{|}~  
ÇüéâäåçêëèìíîË  
ÆøöôûüÿÖÜø£×f  
áíóúñÑæœ¿½¼  
ß

### Prodigy Plus 152

!"#\$%&'()\*+,-./  
0123456789:;<=>?  
@ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\]^\_  
'abcdefghijklmnop  
pqrstuvwxyz{|}~  
ÇüéâäåçêëèìíîË  
ÆøöôûüÿÖÜø£×f  
áíóúñÑæœ¿½¼ß

## Font 3

Identifies a 62-character alphanumeric font, uppercase. Characters are 27 dots high, 14 dots wide, and 2 dots spacing.

### Prodigy Plus

#\$%& (>)\*+,-./  
0123456789:  
ABCDEFGHIJKLMNO  
PQRSTUVWXYZ  
ÇÄÅÉÊÖÜø£Ñ¿ß

### Prodigy Plus 152

#\$%& (>)\*+,-./  
0123456789:  
ABCDEFGHIJKLMNO  
PQRSTUVWXYZ  
ÇÄÅÉÊÖÜø£Ñ¿ß

#### Font 4

Identifies a 62-character alphanumeric font, uppercase. Characters are 36 dots high, 18 dots wide, and 3 dots spacing.

#### Prodigy Plus

#\$%& ( ) \* + , - . /  
0123456789:  
ABCDEFGHIJKLMNO  
PQRSTUVWXYZ  
ÇÄÅÉÆÖÜ£Ñ¿ß

#### Prodigy Plus 152

#\$%& ( ) \* + , -  
0123456789:  
ABCDEFGHIJKLMN  
OPQRSTUVWXYZ  
ÇÄÅÉÆÖÜ£Ñ¿ß

### Font 5

Identifies a 62-character alphanumeric font, uppercase. Characters are 52 dots high, 18 dots wide, and 3 dots spacing.

#### Prodigy Plus

#\$%& ( ) \* + , - . /  
0123456789:  
ABCDEFGHIJKLMNO  
PQRSTUVWXYZ  
ÇÄÅÉÆÖÜ£Ñ¿ß

#### Prodigy Plus 152

#\$%& ( ) \* + , -  
0123456789:  
ABCDEFGHIJKLMN  
OPQRSTUVWXYZ  
ÇÄÅÉÆÖÜ£Ñ¿ß

**Font 6**

Identifies a 62-character alphanumeric font, uppercase. Characters are 64 dots high, 32 dots wide, and 4 dots spacing.

Prodigy Plus

# \$ % & ( ) \* + , -  
0 1 2 3 4 5 6 7 8 9 :  
A B C D E F G H I J K L M  
P Q R S T U V W X Y Z  
Ç Ä Å É Æ Ö Ü £ Ñ ¿ ß



Prodigy Plus 152

#\$% ( ) \* +  
01234567  
ABCDEFGH  
OPQRSTUVWXYZ  
WXYZ  
IJKLMN  
, - . /  
Ç Ä Å É Æ Ö Ü £

### Font 7

Identifies a font that prints OCR-A, size I. Characters are 32 dots high, 15 dots wide, and 5 dots spacing.

#### Prodigy Plus

. , : ; = + / \* " { } % ? &  
' - \$ ^ [ ] < > ( ) ! # @ \  
0 1 2 3 4 5 6 7 8 9  
A B C D E F G H I J K L M  
N O P Q R S T U V W X Y Z  
a b c d e f g h i j k l m  
n o p q r s t u v w x y z

#### Prodigy Plus 152

. , : ; = + / \* " { } % ? &  
' - \$ ^ [ ] < > ( ) ! # @ \  
0 1 2 3 4 5 6 7 8 9  
A B C D E F G H I J K L M  
N O P Q R S T U V W X Y Z  
a b c d e f g h i j k l m  
n o p q r s t u v w x y z

### Font 8

Identifies a font that prints OCR-B, size III. Characters are 28 dots high, 15 dots wide, and 5 dots spacing.

#### Prodigy Plus

C E N S T X Z + < > |  
0 1 2 3 4 5 6 7 8 9

#### Prodigy Plus 152

C E N S T X Z + < > |  
0 1 2 3 4 5 6 7 8 9

## Font 9

Identifies the CG Triumvirate smooth font. The characters are available in upper and lowercase. Point sizes are selected by number in the bar code height.

Prodigy Plus

6pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890abcdefghijklmnopqrstuvwxyz  
8pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890abcdefghijklmnopqrstuvwxyz  
10pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890abcdefghijklmnopqrstuvwxyz  
12pt ABCDEFGHIJKLMNOPQRSTUVWXYZ123456abc  
14pt ABCDEFGHIJKLM1234567abcdefghijk  
18pt ABCDEFGHIJKLM1234567abcd  
24pt ABCDE12345abcdefg  
30pt ABCDE123abcd  
36pt ABC123abc  
48pt ABC123

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
 0123456789abcdefghijklmnopqrstuvwxyz  
 !"#%&'()\*+,-./012345  
 6789:;<=>?@[\]^\_`{|}~Çüéâäå  
 èïîËÄÉæÆôöòûùÿÖÜø£Ø×ƒáíóúñ  
 ®½¼¡âà©¢¥ãäõðēēēìíîïßôòõ  
 μρρúûùýý±¾÷ˆˆˆ

(Font 9 Continued)

Prodigy Plus 152

6pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890abcdefghijklmnopqrstuvwxyzABCDE  
8pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890abcdefghijklmnopqrstuvwxyz  
10pt ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890abcdef  
12pt ABCDEFGHIJKLMNOPQRST1234567abcdefghi  
14pt ABCDEFGHIJKLM1234567abcdefghijkL  
18pt ABCEFGHIJKLM1234567abcd  
24pt ABCDE12345abcdef  
30pt ABCDE123abcd  
36pt ABC123abc  
48pt ABC123

ABCDEFGHJKLMNOPQRSTUVWXYZ  
XYZ0123456789abcdefghijklmnopqrstuvwxyz  
rstuvwxyz !"#\$%&'()\*+,-./012345  
6789:;<=>?@[ \ ] ^ \_ ` { | } ~ Ç ü é â ä å  
ç ê ë ì ï ð ñ Ä Å Æ æ Æ ô ö ò û ü ÿ Ö Ü ø £ Ø × f á  
Ñ ¿ º ½ ¼ ¡ Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò  
Þ Ù Ú Û Ü Ý Þ ß à á â ã

## 7.3 Bar Code Examples

### Bar Code A

Identifies the Code 3 of 9 bar code with a human readable font. Code 39 is an uppercase, alphanumeric bar code that is variable in length. The valid ASCII characters for this font are: 32, 36-37, 42-43, 45-47, 48-57, 65-90. Code 3 of 9's normal wide to narrow bar ratio is 3:1.

Prodigy Plus



ABC123

Prodigy Plus 152



ABC123



ABC123



ABC123

### Bar Code B

Identifies the UPC-A bar code. Numeric-only bar code with a fixed length of 12 characters. Eleven digits supplied by host or application software, 12th digit checksum supplied by printer. If the 12th digit is sent by the host, the printer will check that character against the calculated checksum and will print the bar code as all zeros if they do not match. Addendum codes for this font are described by fonts M and N. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6, and 8:8. These ratios actually specify size of elements since UPC type bar codes are element based and not ratio based. (Maximum 10 bar codes per label.)

Prodigy Plus

113%



0 9872349782 5

Prodigy Plus 152

100%



0 9872349782 5

76%



0 9872349782 5

Option V- Identifies Random Weight UPC bar code. The seventh digit supplied by the host or application software must be an uppercase V followed by 4 digit weight information. Eleven digit checksum is supplied by the printer.

Prodigy Plus

Prodigy Plus 152



**Bar Code C**

Identifies the truncated UPC-E bar code. Numeric-only bar code with a fixed length of 7 characters. Six digits supplied by host or application program, 7th digit checksum supplied by printer. If the 7th digit is sent by the host, the printer will check that character against the calculated checksum and will print the bar code as all zero if they do not match. Addendum codes for this font are described by fonts M and N. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6, and 8:8. These ratios actually specify size of elements since UPC type bar codes are element based and not ratio based.

Prodigy Plus

Prodigy Plus 152



**Bar Code D**

Identifies the Interleaved 2 of 5 bar code. I 2 of 5 is a numeric-only code. The ASCII range for the numeric codes is 48-57. Code I 2 of 5's normal wide to narrow bar ratio is 5:2. (Maximum 8 bar codes per label.)

Prodigy Plus

Prodigy Plus 152



## Bar Code E

Identifies the Code 128 variable length bar code with modulo 103 checksum calculation. Code 128 can encode the entire 128 ASCII character set, including both uppercase and lowercase alpha characters. Code 128 is an element based bar code similar to the UPC fonts. Therefore ratios must be equal to one. The valid ratios are 1:1, 2:2, 3:3, 4:4, 6:6 and 8:8.

The Prodigy Plus™ supports Code 128 Code Subset A, B, and C. You can select the printer to start on any code subset and switch to another with the data area (default is subset B).

Code Subset A includes all of the standard upper case alphanumeric keyboard characters plus the control and the special characters. To select Code Subset A, precede the data to be encoded with an ASCII A (DEC 65, HEX 41).

Code Subset B includes all of the standard upper case alphanumeric keyboard characters plus lower case alphabetic and special characters. To select Code Subset B, precede the data to be encoded with an ASCII B (DEC 66, HEX 42). If no start character is sent for the 128 font, Code Subset B will be selected by default.

Code Subset C includes the set of 100 digit pairs from 00 through 99 inclusive, as well as special characters. Code Subset C is used for double density encoding of numeric data. To select Code Subset C, precede the data to be encoded with an ASCII C (DEC 67, HEX 43). You must not try to encode alpha data if you select Code Subset C.

## Special Character Handling

Characters above ASCII value 95 are considered special characters. To access these values, a two character reference table has been built into the Prodigy Plus™ Label Printer. The following table describes this reference.

ASCII	2 CHAR	CODEA	CODEB	CODEC
96	&A	FNC3	FNC3	-NA-
97	&B	FNC2	FNC2	-NA-
98	&C	SHIFT	SHIFT	-NA-
99	&D	CODEC	CODEC	-NA-
100	&E	CODEB	FNC4	CODEB
101	&F	FNC4	CODEA	CODEA
102	&G	FNC1	FNC1	FNC1

As an example, to get FNC2 to be encoded into a Code Subset A bar code, send the ASCII & (ASCII 38, HEX 26) followed by an ASCII B (DEC 66, HEX 41), code FNC2 will be encoded.

Example:            ATEST&B123

Data Encoded:     TEST<FNC2>123

### Control Codes

Control characters can be encoded into Code Subset A by sending the lowercase ASCII characters a-z, a = SOH, b = STX, c = ETX and so on.

### Font Sizing

The font sizing for a 128 on Rotation #2 is not consistent because of the variable character code to character correlation. Therefore the row address may have to be adjusted to place it properly.

Prodigy Plus



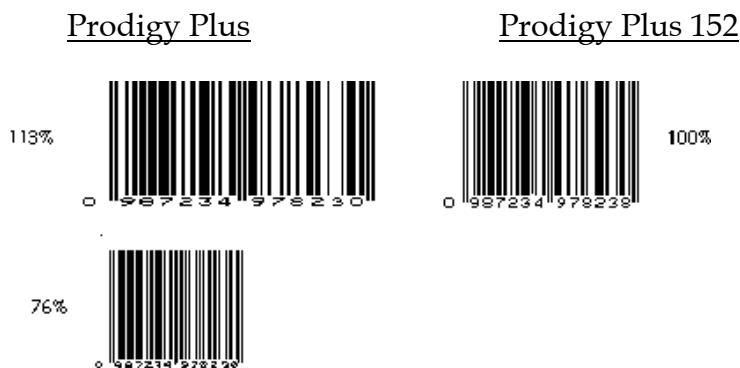
Prodigy Plus 152





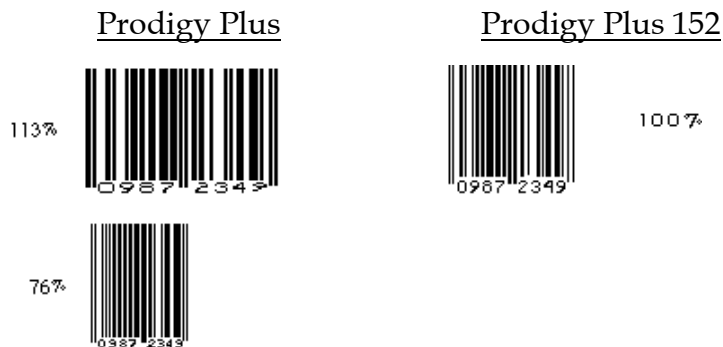
### Bar Code F

Identifies the standard EAN-13 bar code, Numeric-only bar code; fixed in length. Twelve digits are supplied by host or application software, 13th digit checksum supplied by printer. If the 13th digit is sent by the host, the printer will check that character against the calculated checksum and will print the bar code as all zeros if they do not match. Addendum codes for this font are described by fonts M and N. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6 and 8:8. These ratios actually specify size of elements since EAN type bar codes are element based and not ratio based. Maximum 12 bar codes per label.



### Bar Code G

Identifies the truncated EAN-8 bar code. Numeric-only bar code; fixed in length. Seven digits are supplied by host or application software, 8th digit supplied by printer. If the 8th digit is sent by the host, the printer will check that character against the calculated checksum and will print the bar code as all zeros if they do not match. Addendum codes for this font are described by fonts M and N. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6 and 8:8. These ratios actually specify size of elements since EAN type bar codes are element based and not ratio based.



## Bar Code H

Identifies the HIBC (modulo 43 checksum) version of the code 3 of 9 bar code. The checksum will be placed at the end of the data string that is received from the host. The host device must supply a leading + to identify the data format type. Code 39 is an uppercase, alphanumeric bar code that is variable in length. The valid ASCII characters for this font are 32, 36-39, 42-43, 45-47, 48-57 and 65-90. Code 3 of 9's normal wide to narrow bar ratio is 3:1.

Prodigy Plus



Prodigy Plus 152



## Bar Code I

Identifies the 20-character CODABAR bar code. CODABAR is basically a numeric bar code with some special additional characters. These characters are 0123456789ABCD\$+-./. The length of the code is variable and is normally printed with a 3:1 ratio. CODABAR needs a start and stop character.

Prodigy Plus



Prodigy Plus 152



## Bar Code J

Identifies an I 2 of 5 bar code with modulo 10 checksum calculation. The ASCII range for the numeric codes is 48-57. Code I 2 of 5's normal wide to narrow bar ratio is 5:2. Font D and L also print different forms of the I 2 of 5 bar code. Maximum 8 bar codes per label.

Prodigy Plus



Prodigy Plus 152



## Bar code K

Identifies the Plessey bar code.

Prodigy Plus



Prodigy Plus 152



## Bar Code L

Identifies an I 2 of 5 bar code with modulo 10 checksum (UPC shipping container symbology) that does the special human readable formatting for and adds bearer bars to the top and bottom of bars when encoding 13 digits. The ASCII range for the numeric codes is 48-57. Code I 2 of 5's normal wide to narrow bar ratio of 5:2. Font d and L also print different forms of the I 2 of 5 bar code. There must be a maximum of 8 bar codes per label.

Prodigy Plus



Prodigy Plus 152



## Bar Code M

Identifies the 2 digit addendum code for UPC fonts. It is a numeric-only bar code with a fixed length of 3 characters. Two characters supplied by the host or application software, the third digit checksum supplied by printer. If the third digit is sent by the host, the printer will check that character against the calculated checksum and will print the bar code as all zero if they do not match. Addendum codes for this font are described by fonts M and N. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6 and 8:8. These ratios actually specify size of elements since UPC type bar codes are element based and not ratio based. It must be placed after the UPC/EAN code manually. This code should be placed 9 moduli away from the end of preceding bar codes.

Prodigy Plus



Prodigy Plus 152



## Bar Code N

Identifies the 5 digit addendum code for UPC fonts. It is a numeric-only bar code with a fixed length of 6 characters. Two characters supplied by the host or application software, the sixth digit checksum supplied by printer. If the sixth digit is sent by the host, the printer will check that character against the calculated checksum and will print the bar code as all zeros if they do not match. Addendum codes for this font are described by fonts M and N. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6 and 8:8. These ratios actually specify size of elements since UPC type bar codes are element-based and not ratio based. It must be placed after the UPC/EAN code manually. This code should be placed 9 moduli away from the end of preceding bar codes.

### Prodigy Plus



### Prodigy Plus 152



## Bar Code O

Identifies the Code 93 bar code. Code 93 is an upper and lower case alpha numeric bar code. The normal ratios that the printer can print are 1:1, 2:2, 3:3, 4:4, 6:6 and 8:8. These numbers actually specify size of magnification and are element-based, not ratio based. The ASCII characters that are permissible for Code 93 are :

,&#0\$%\*+

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

abcdefghijklmnopqrstuvwxyz.

### Prodigy Plus



### Prodigy Plus 152



### Bar Code P

Postnet bar code. This is the small bar code on letters encodes Zip codes. It usually contains a 9 digit code followed with a checksum value. Sometimes a two digit post office code will be attached to the zip code.



### Bar Code Q

UCC/EAN 128 bar code. This code must have 19 digits sent to the printer for the code to print out.



### Bar Code R

UCC/EAN 128 bar code. This bar code is set up for the K-MART specifications. This code must have 18 digits sent to the printer for the code to print out.

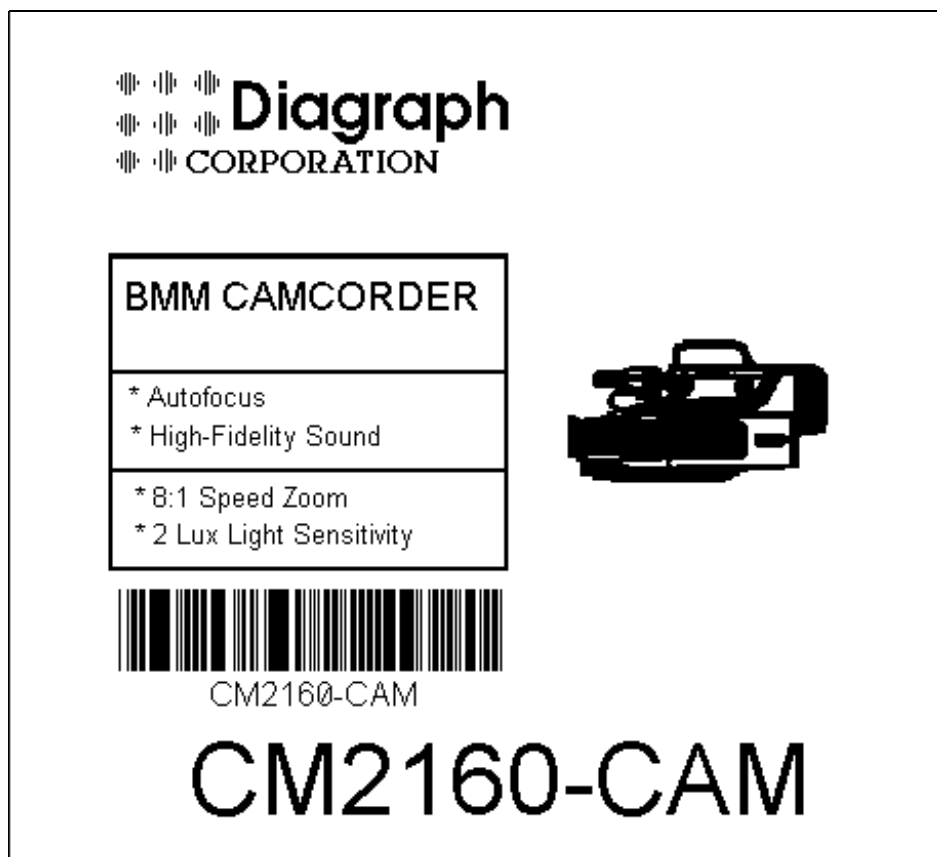


## 7.4 Sample Label Parameters and Fonts

The sample label parameters and fonts illustrated apply to the standard Prodigy Plus 203 dpi.

^BL  
D11  
191100900000055CM2160-CAM  
1a6204000800015CM2160-CAM  
112200000650065CM2160-CAM  
191100502600020BMM CAMCORDER  
191100502350020WITH REMOTE  
191100302050020\* Autofocus  
191100301850020\* High-Fidelity Sound  
191100301570020\* 8:1 Speed Zoom  
191100301380020\* 2 Lux Light Sensitivity  
1X1100001300010B200160002002  
1X1100001800012L196002  
1X1100002300012L196002  
1Y1100001270250CAM  
1Y1100002950013LOGO

E



**NOTE:** Field with font type Y specifies an image loaded in a memory module.

^BL

D22

1911002014500552345

1E2212500000005C005940928123401&E^

1X1100001450010B300060002002

1X1100001750012L296002

1X1100001470115L002028

1X1100001470235L002028

1X1100001770235L002026

1X1100001770185L002026

101100001500015NUMBER

101100001600015SERIAL

101100001500118PRODUCT

101100001500240BRAND

101100001800240LINE

101100001800015PLANT

191100301740070P-12621

191100301740190KK

19110030174027501

191100201450159005940

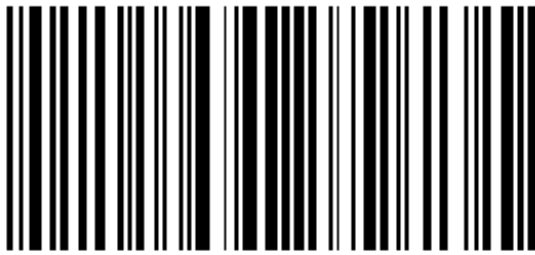
191100201450268928

4a3104000000380ABCDE12345


121100103000000PRODIGN PLUS WITH RIBBON SAVER

E

PRODIGN PLUS WITH RIBBON SAVER			
PLANT	P-12621	KK	LINE 01
SERIAL NUMBER	2345	PRODUCT 005940	BRAND 928



005940928123401^





^BL

D11

491100600850333000001

+01

4a9305000100380S000001

+01

421100000100328 (S)

4211000001003128SERIAL

1X1100004130305L002090

1X1100005030305L002090

4a9305000100300V032380

421100000100248 (V)

421100000100238SUPPLIER

491100600850252032380

1X1100000100225L002590

4a9305000100220Q30

421100000100135 (Q)

421100000100125QUANTITY

49110090085016830

1X1100000100113L002590

4a9305000100108P72715-FE3-0030

421100000100030 (P)

421100000100020PART NO.

49110090085006272715-FE3-0030

491100200100393

1X1100002900115L110003

1X1100004100227L175003

1X1100005100227L175003

491100804220380AA

421100004220320ZONE

491100805220380CC

421100005220320PLANT

43130000430029003-13-70

421100004220240MFG. DATE

421100005220240AUDITOR





491100805220295RW

491100803020215PANEL

491100803020170LF DOOR

421100003020125DESCRIPTION

E

PART NO. (P)		<b>72715-FE3-0030</b>	
			
QUANTITY (Q)		DESCRIPTION	
<b>30</b>		<b>LF DOOR PANEL</b>	
			
SUPPLIER (V)		MFG DATE	AUDITOR
		<b>03-13-99</b>	<b>RW</b>
SERIAL (S)		ZONE	PLANT
		<b>AA</b>	<b>CC</b>

^BL

D11

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49110060020003533121111111

431100002300025(1P)

4a6205000200174AA10000

491100600200123AA10000

431100001700115(S)

4911005001002103300 12X12 CORDED TABLET WITH

491100500100230BUTTON INLINE CURSEOR - PC

491100500100250100/110

1X1100000040180L004392

1X1100000040270L004392

491100400100295DIAGRAPH CORPORATION

4911004001003123401 RIDER TRAIL SOUTH

491100400100347 USA

491100400100363 (800) 521-3047

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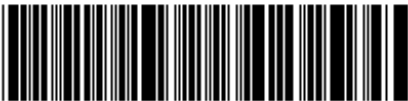
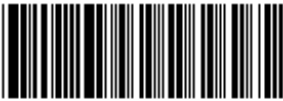

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3300 12X12 CORDED TABLET WITH BUTTON INLINE CURSOR - PC 100/110	
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DIAGRAPH CORPORATION 3401 RIDER TRAIL SOUTH EARTH CITY, MO 63045 USA (800) 521-3047	97598 (2V) 

## 8.0 PRINTING LABELS WITH *PERFORMANCE SERIES FOR WINDOWS™*

For optimum performance, ease and convenience, Diagraph recommends the labeling software package called *Performance Series for Windows™*.

Diagraph's *Performance Series for Windows™* creates labels and combines a database for storage with capabilities for serialized fields. It has on screen graphics that accurately represent the format while it is being built field by field. It supports many windows features. With the Window Recorder Function you can record a sequence of keystrokes and mouse actions called a macro. Using a macro can shorten any frequently used phrase or steps of any routine. This software supports the fonts and barcodes resident in the Prodigy Plus™ print engine. It also supports the graphic file types, .BMP, .PCC and .PCX.

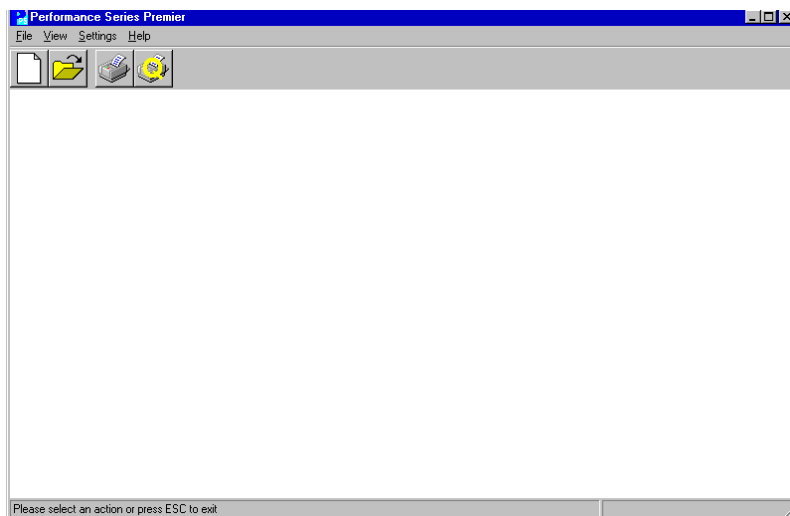
This section describes printer configuration and label formatting specifically for the PA/4000. This section does not contain information about creating, editing or deleting labels from your database. For information on these topics, consult your Diagraph *Performance Series for Windows™* Software Manual.

### 8.1 Printer Configuration Setup

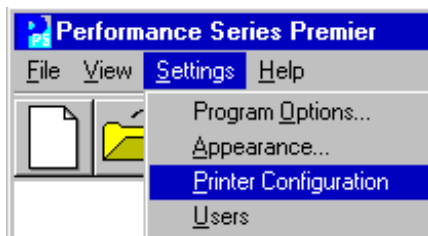
From the Windows Program Manager, double-click on the Performance Series icon.



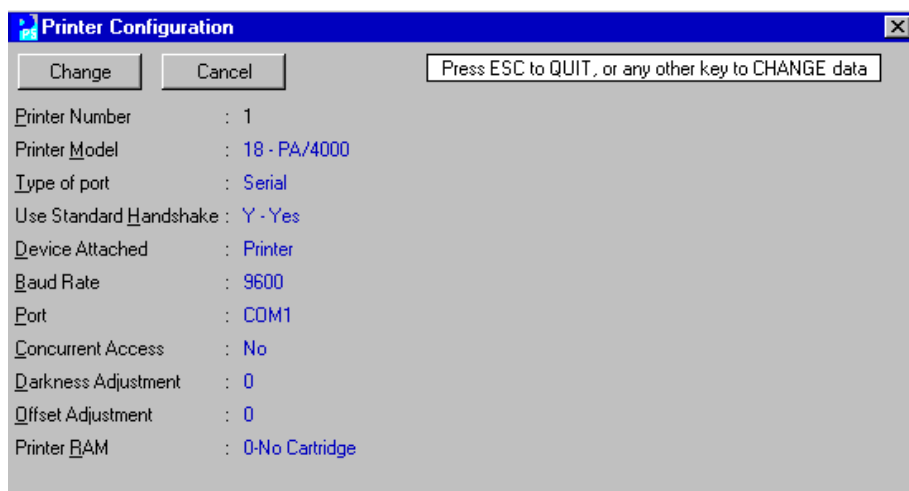
The Performance Series Main Menu will appear:



Click on the Settings from the Menu bar. Click on Printer Configuration.



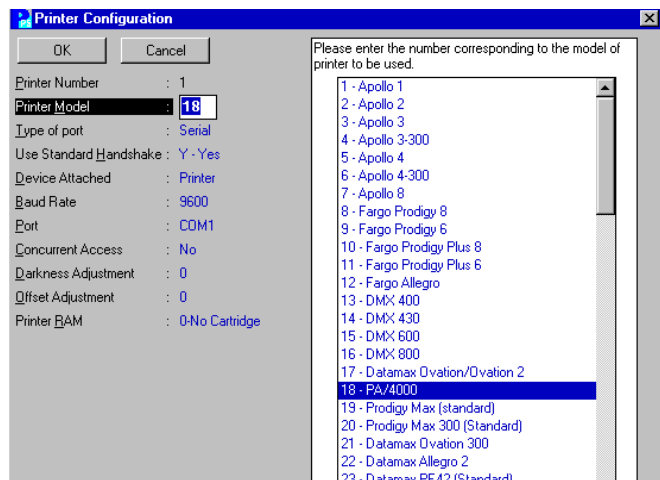
You will see the Printer Configuration menu. Click on the printer you will use. A configuration menu appears:



You must set three options under Printer Configuration to use Performance Series with the PA/4000.

1. Click on Printer Model and set the to PA4000.
2. Set the Offset Adjustment to 0 (Default setting is 0).
3. Set Translucent Ribbon to NO regardless of the type of ribbon used. The Hand-Held Terminal allows the system to print with translucent ribbon using the *Transfer* function.

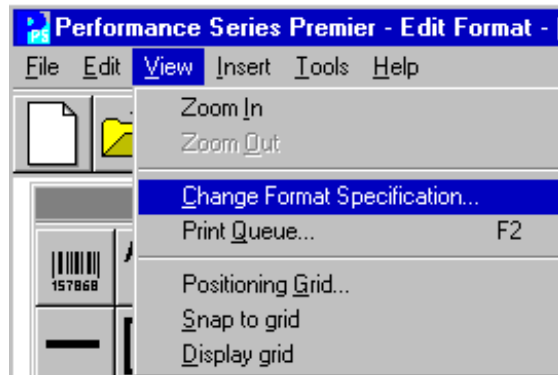
Restart program to activate changed options.



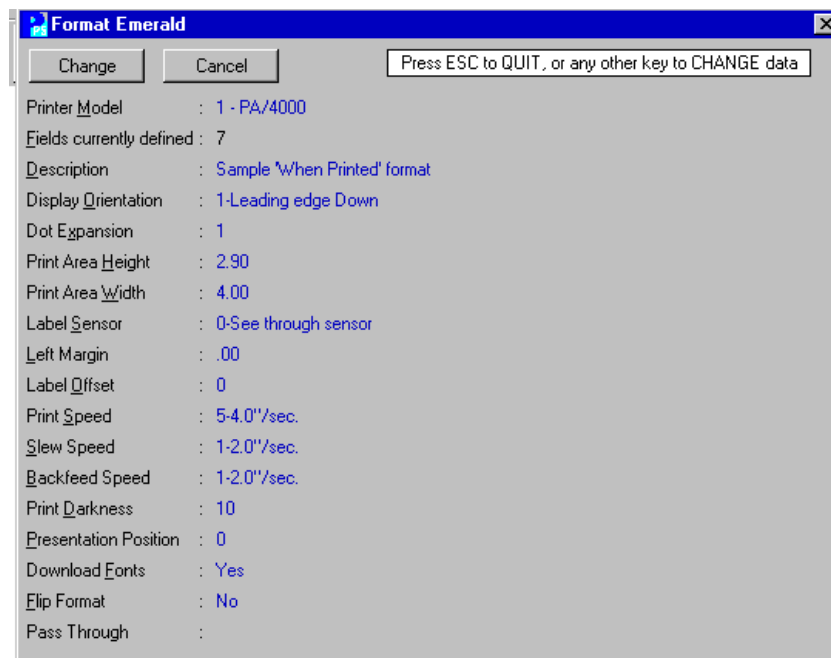
## 8.2 Label Format Setup

After the Printer Configuration options have been set, you are ready to open an existing label and format it. To do this:

Click on the Open icon from the Menu bar and choose an existing label. Click on View then on Change Format Specification.



You will see the Format screen.



Change the options by clicking on the item.

Set the options:

1. Set the Label Offset to 0.

(May need to be adjusted. If you are driving the PA4000 directly with custom software, set the DIP switch positions DSW1 as shown below).

2. Set the Presentation Position to 0.

(May need to be adjusted. If you are driving the PA4000 directly with custom software, set the DIP switch positions DSW1 as shown below).

SW1-1	Depends on RS-232 Baud Rate
SW1-2	Depends on RS-232 Baud Rate
SW1-3	Depends on RS-232 Baud Rate
SW1-4	depends on number of databits
SW1-5	OFF PA4000
SW1-6	ON Enable label present sensor*
SW1-7	OFF Standard ribbon
SW1-8	ON Enable cutter*

\*Required

3. Set the Cut Option to 1
4. For label offset of 95 must transmit 0198.
5. For presentation position of 155 must transmit f283.

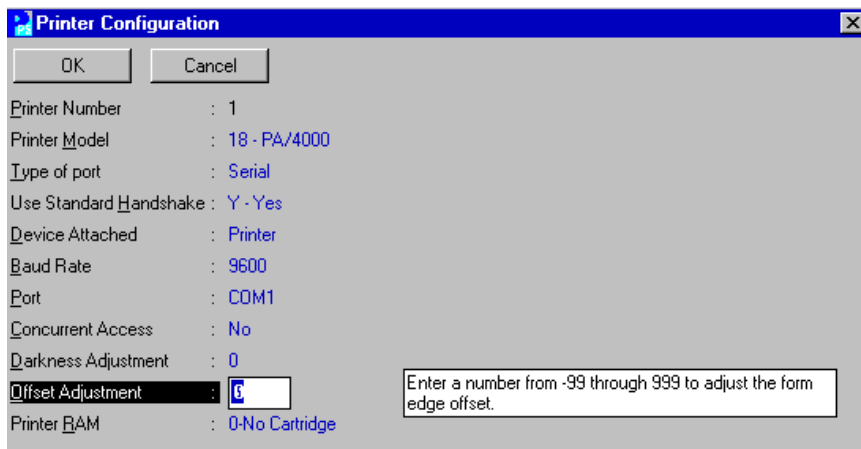
Refer to Datamax Prodigy Plus™ Print Engine programming guide for more information. The guide can be downloaded free from [www.datamaxcorp.com](http://www.datamaxcorp.com).

Please note that the offset and presentation position may need to be adjusted to get label properly dispensed and print position set correctly.

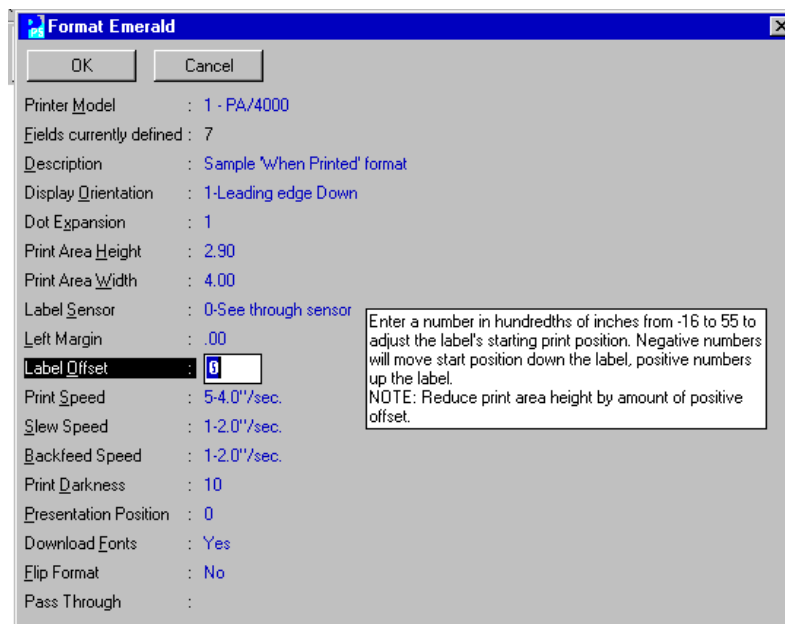
Click OK to set the new format.

The *Performance Series for Windows™* Software allows you to control two different label offsets.

1. All LABEL OFFSET ADJUSTMENT - controls the offset value for all of the labels in your database. This is found under the Settings - Printer Configuration menu. Click twice on the printer chosen and this screen appears:



2. SPECIFIC LABEL OFFSET - controls the offset value for a specific label in your database. This is found under the View - Change Format Specification menu when you have an existing label opened.



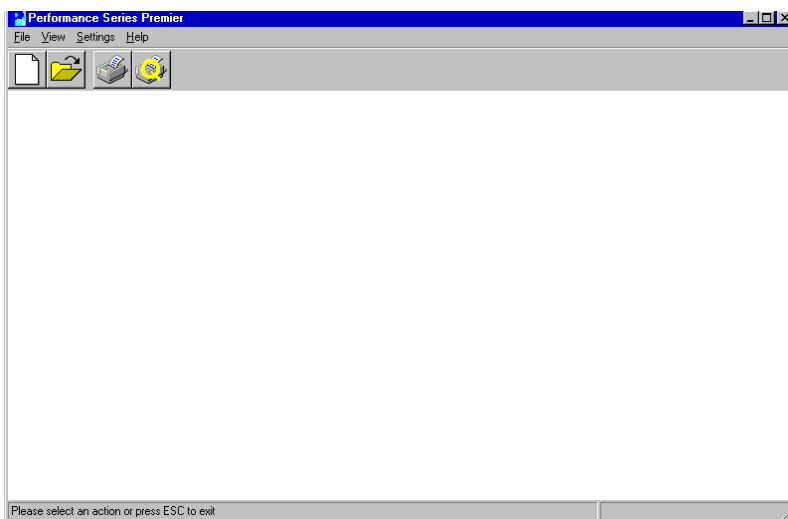
**IMPORTANT:** The total offset value of the label is determined by adding the OFFSET ADJUSTMENT and LABEL OFFSET values together.

## 8.3 Printing a Label

Double-click on the Performance Series icon.

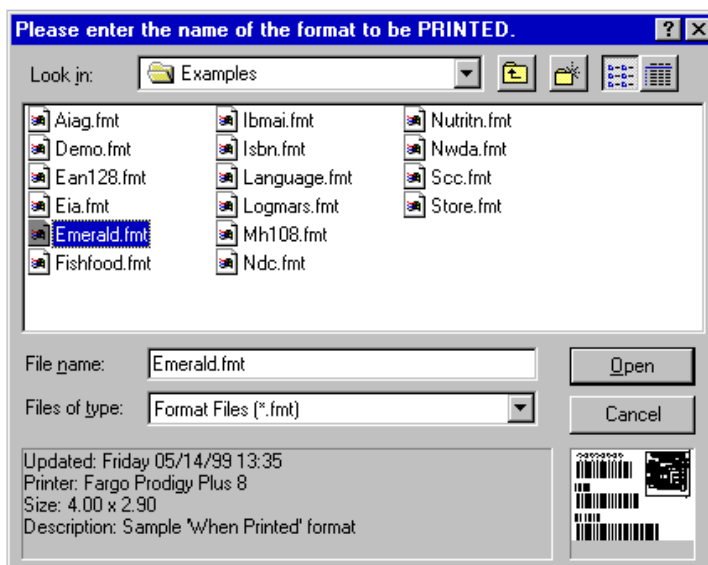


The Performance Series Main Menu will appear.



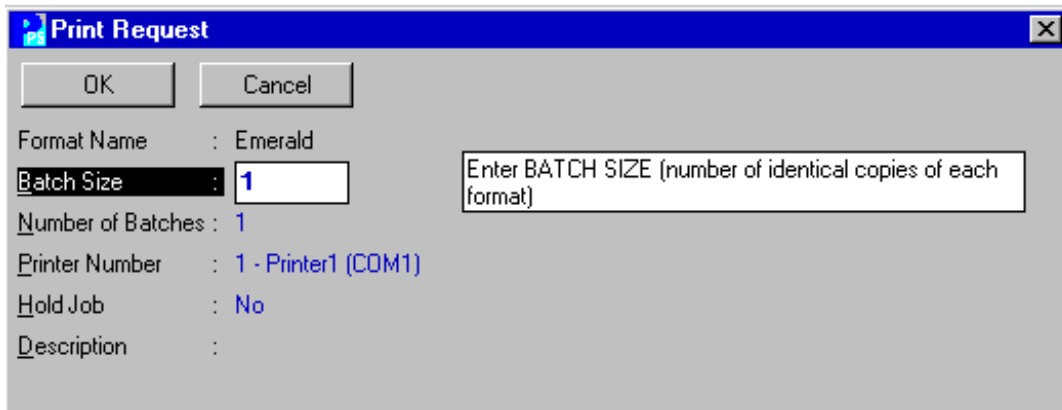
Click on the Printer icon.

The Print Format screen will appear. Click on a label to be printed and click Open. When the label opens click the printer icon to send that label to the printer.





Once you have sent a label to print, the Print Request screen will appear.



The image shows a Windows-style dialog box titled "Print Request". It has a blue title bar with a close button (X) in the top right corner. Below the title bar are two buttons: "OK" and "Cancel". The main area of the dialog contains several fields and labels:

- Format Name** : Emerald
- Batch Size** : 1 (The text "Batch Size" is underlined. To the right of the input field is a tooltip that says "Enter BATCH SIZE (number of identical copies of each format)".)
- Number of Batches** : 1
- Printer Number** : 1 - Printer1 (COM1)
- Hold Job** : No
- Description** :

Click OK to download the selected label to the PA/4000.

## 9.0 MAINTENANCE

### 9.1 Daily Maintenance

#### ***Clean the Printhead.***

- Turn OFF the printer and unplug the unit from the outlet before cleaning the printhead. Clean the printhead after each ribbon/label change. Clean with alcohol and swabs.

#### ***Clean the Air Filter.***

- Purge by cycling the OSHA valve ON and OFF.
- Check air pressure setting.

### 9.2 Weekly Maintenance

#### ***Clean the Label Low Sensor located behind the Label Supply Disc.***

- Blow off with dry shop air to remove dust and adhesive.

#### ***Clean the Label Present Sensor on the Tamp Pad.***

- Blow off with dry shop air to remove dust and adhesive.

#### ***Clean the Auto-Retract Sensor on the Tamp Pad.***

- Blow off with dry shop air to remove dust and adhesive.

### 9.3 Monthly Maintenance

#### ***Clean the Label Low Sensor located behind the Label Supply Disc.***

- Clean with an alcohol swab.

#### ***Clean the Leading Edge Sensor on the Print Engine.***

- Clean with an alcohol swab.

#### ***Clean the Ribbon Sensor on the Print Engine.***

- Clean with an alcohol swab.

#### ***Clean the Label Rollers and Guides of Label Residue.***

- Clean with an alcohol swab.

#### ***Clean the Ribbon Rollers and Guides of Ribbon Residue.***

- Clean with an alcohol swab.

## 9.4 Six Month Maintenance

### ***Replace the Vacuum Filter.***

- This filter — 6150322 — is available in the PA/4000 Filter Kit, 6150-806.

## 9.5 Intermittent Maintenance

- Clean the printhead each time the label and/or ribbon is replaced.
- Replace the printhead when any degradation in print quality is noticed.



CAUTION: Utilize the appropriate safety equipment as prescribed by your supervisor during the performance of routine periodic maintenance.



WARNING: Loss of air pressure can cause the tamp head assembly to drop into the path of the oncoming product. This can damage the PA/4000. To prevent this, be sure there are no products on the line or pull the PA/4000 away from the line before sliding the air valve to OFF.

## 9.6 Yearly

Inspect the print engine drive roller for debris, cuts or other wear or damage.

## 10.0 TROUBLESHOOTING

Attention to detail and common sense will greatly reduce the risk of accidents. For safety, always stop the conveyor first.

Whenever troubleshooting, always start by checking for error messages on the Hand-Held Terminal.

### **Cautions**

- Triple check the photosensor distance.
- Disable the secondary wipe-down when not in use. Change the output pulse value to 25 with the Hand-Held terminal, the cylinder will not fire if the output pulse value is 25 or lower.
- Make sure the edge value for the photosensor 1 is correct.
- Check that the tamp dwell setting is correct.

## 10.1 POWER PROBLEMS

**Problem:**        **The power LED light is not lit.**

**Possible Cause:**    **Loss of power.**

- ACTION:
1. Make sure that the power cord is undamaged and plugged into a 120V outlet.
  2. Make sure that the power switch is turned ON.
  3. Check the fuses.
  4. Check for bad electrical outlet.

**Problem:**        **On start up, the solenoids continue cycling, there is no digital on the hand-held and all lights are on or flashing.**

**Possible Cause:**    **Applicator board is bad.**

- ACTION:
- Replace the applicator board.

**Problem:**        **No motor voltage, engine will not run.**

**Probable Cause:**    **Prodigy Plus™ board is bad.**

- ACTION:
- Check the printhead cable. Check motor for continuity. Check the input voltage to the Prodigy Plus™ board from the transformer and diode block. If all is well, replace the Prodigy Plus™ board.

**Problem:**      **No motor response and printer error shows on hand-held after 2 seconds following pushing of the feed button.**

**Probable Cause:**    **Prodigy Plus board or motor is bad.**

**ACTION:**            Check the voltage to the Prodigy Plus™ board. Check that the cables are properly plugged in. Check the solder joints on the stepper motor. If solder is bad replace the motor. If there is still no response, replace the Prodigy Plus™ board.

**Problem:**      **No voltage from Prodigy Plus™ board to Applicator board.**

**Probable Cause:**    **Applicator board is bad.**

**ACTION:**            Check the motor voltage at TP4.

### 10.3 PRINTING PROBLEMS

**Problem:**      **No power.**

**ACTION:**            Power Problems, see Section 10.2.

**Problem:**      **Won't print**

**Possible Cause:**    **Printer could be in pause mode.**

**ACTION:**            Press PAUSE/RESUME key to resume printing.

**Possible Cause:**    **Printer could be stopped.**

**ACTION:**            Press PAUSE/RESUME key to resume printing.

**Possible Cause:**    **PC has not sent a batch of labels to the PA/4000.**

**ACTION:**            Send the labels.

**Possible Cause:**    **Label present sensor saturated.**

**ACTION:**            Shade the PA/4000 from all ambient light.

**Possible Cause:**    **Bad cable connection.**

**ACTION:**            Check cable connection.

**Possible Cause:**    **Printhead lift lever is not locked down.**

**ACTION:**            Push lever down.

**Possible Cause:**    **Ribbon or labels not routed correctly.**

**ACTION:**            Re-route ribbon or label. See Sections 4.13 and 4.14.

**Possible Cause:**    **The label-present sensor is dirty or blocked.**

**ACTION:**            Clean the sensor with a soft-tipped swab and isopropyl alcohol.

**Possible Cause:** Ribbon or label roll may be bad.

**ACTION:** Change ribbon or label roll.

**Problem: Printer skips every other label**

**Possible Cause:** Line is moving too fast for selected print speed.

**ACTION:** Select new print speed with your labeling software package.

**Problem: Printer continues to run after ribbon has run out.**

**Possible Cause:** Transfer menu select item in the hand-held terminal is set to OFF.

**ACTION:** Set transfer to ON via the hand-held terminal.

**Problem: The print engine is feeding out blank labels.**

*Blank labels can be the result of a label problem, a ribbon problem or a software problem.*

**Possible Cause:** The ribbon is loaded incorrectly.

**ACTION:** Compare the path of the ribbon with the path shown on the label inside the print engine housing.

**Possible Cause:** Wrong ribbon is loaded

**ACTION:** Different print engines have different ribbon requirements. Make sure that the ribbon loaded in your print engine is compatible. Check the print engine manual or call Diagraph at 1-800-526-2531.

**Possible Cause:** Failed true type font and/or graphic download.

**ACTION:** Check both the manual for your label-formatting software and the print engine manual. Verify parameters, reset and try again.

**Possible Cause:** Low darkness setting

**ACTION:**

1. Check the Performance Series™ or other label-formatting software manual for appropriate label darkness settings.
2. Check the Hand-Held terminal darkness setting. See Section.5.2.

**Possible Cause:** Blank label format downloaded.

**ACTION:** Check the Performance Series™ or other software manual for label formatting procedures.

**Possible Cause:** The ribbon and the label are incompatible

**ACTION:** Unsatisfactory printing occurs when the print engine has been set for direct-thermal printing but has been loaded with labels that require a

ribbon for good print contrast. To avoid this situation, make sure that you use labels designed for direct-thermal printing. If your print engine has been set to print with a ribbon in the thermal transfer mode, use ATS labels – Diagraph labels designed for thermal transfer printing.

**Possible Cause: Right-hand vs. left-hand print engine driver configuration.**

**ACTION:** Refer to the Performance Series™ or other label-format software manual for correct configuration.

**Possible Cause: The ribbon is broken.**

**ACTION:** Check for error messages on the Hand-Held terminal LCD. Replace broken ribbon and check ribbon tension.

**Possible Cause: The ribbon has been loaded upside down.**

**ACTION:** When the ribbon is loaded upside down, the ink adheres to the printhead and not to the label. Remove the ribbon and install it correctly. Clean the printhead with isopropyl alcohol.

**Software Causes: The message is blank, has incorrect parameters (such as Offset) or is requesting something the printer does not understand such as a special font or graphic.**

**ACTION:** Examine the message and all its requirements. If all print demands seem to fall within the capabilities of the print engine, run a test label. If the label still prints blank, exit the software and reenter. Try printing the label again. Often, a warm reboot will produce a successful printing.

**Problem: The labels are only partially printed.**

**Probable Cause: Accumulated material on the label drive roller located behind the peel blade.**

**ACTION:** Pause the PA/4000. Release the printhead lift lever. Remove label stock from printer. Clean debris from the label drive roller. Roller can be turned by hand. Reload label stock and lower printhead lift lever to lock the printhead in place.

**Problem: Gaps in line of print.**

**Probable Cause: Label drive roller needs replacing on the engine assembly.**

**ACTION:** Replace label drive roller.

**Problem:**        **No cutter signal.**

**ACTION:**        Check cutter cable connections and conditions. May need to replace Prodigy Plus™ Board.

**Problem:**        **No solenoid reset (clicking) on turning switch ON.**

**Probable Cause:**    **Transformer is bad or there is a bad cable.**

**ACTION:**        Check the input voltage from voltage regulator to applicator board. It should read 0, 5, 25, 0 (white, green, red, black). If the green lead is below 5V, check the voltage across the blue to blue and red to red on the Prodigy J5 plug. It should read 8.5+ volts on each side. If it doesn't read that, the transformer is bad. Unplug all the prodigy cables except J5, J9, J6 and J7 from the rectifier block. Replug one at a time while checking the 5 volt lead on J3. A bad cable will cause a voltage drop, replace the cable.

**Problem:**        **Ribbon and Label won't back up after each label prints.**

**Probable Cause:**    **Label drive roller gear set screw is stripped.**

**ACTION:**        Replace set screw.

**Problem:**        **Edge sensor voltage of 5V will not adjust.**

**Probable Cause:**    **Edge sensor or applicator board is bad.**

**ACTION:**        Pull edge sensor plug J2. If the voltage drops replace the edge sensor. If the voltage remains the same, replace the applicator board.

**Problem:**        **Label is only printing on one or more lines or part of lines.**

**Probable Cause:**    **Printhead is bad.**

**ACTION:**        Check printhead cable. If it is ok, replace the printhead.



## 10.4 TAMPING PROBLEMS

*The problems analyzed in this section are based on the premise that the print engine has successfully dispensed a label and that label is adhering to the pad before the problem occurs.*

**Problem:      Cylinder does not extend to apply label.**

**Possible Cause:**    **System is in pause-mode.**

ACTION:    Press PAUSE/RESUME key to resume printing.

**Possible Cause:**    **Tamp dwell time is too small.**

ACTION:    The tamp dwell time must be set greater than 30 ms to extend the cylinder. If the dwell time is less than 30 ms, increase the value no more than 10 ms at a time. Adjust the tamp dwell-time using the procedure described in Section 5.4.2.

**Possible Cause:**    **Cylinder air pressure set too low.**

ACTION:    Adjust the airflow to the cylinder by turning the tamp air regulator clockwise until the gauge reads 20-40 psi.

**Possible Cause:**    **Photosensor 1 problem.**

ACTION:    1. Check the cable connection between the photosensor and PA/4000.  
              2. Clean the photosensor lens with a soft-tipped swab and isopropyl alcohol.  
              3. Adjust and direct Photosensor 1 at the product.  
              4. Adjust the sensing distance of the photosensor with the potentiometer at the rear of the photosensor.

**Possible Cause:**    **Label-present sensor is not detecting a label on the tamp pad.**

ACTION:    1. Make sure DIP switch 7 is switched ON. See Section 5.3.  
              2. Make sure that the sensor is .20 inches up and not flush with the bottom of the tamp pad. See Section 5.4.5.

**Possible Cause:**    **Cable connections**

ACTION:    Make sure that the Cables are properly connected.

**Possible Cause:**    **Cylinder rods are bent**

ACTION:    Determine what caused the cylinder to bend and call Diagraph Service (1-800-526-2531) for replacement cylinder kit: 6150-830 for 6-inch cylinder assembly; 6150-831 for 12-inch cylinder assembly; or 6150-832 for an 18-inch cylinder assembly.

**Possible Cause:**    **Cylinder airflow control is set incorrectly.**

ACTION:    Review Section 4.17.1.

**Problem:**      ***Cylinder extends but retracts before reaching products.***

**Possible Cause:**    **Tamp dwell time set too small**

- ACTION:
1. The dwell time must be greater than 30 ms to extend the cylinder. If it is less than 30 ms, increase the value no more than 10 ms at a time.
  2. Adjust the tamp dwell-time using the procedure as described in Section 5.4.2.

**Possible Cause:**    **Tamp dwell time with auto-retract ON is set too small for slow-descent cylinder stroke.**

ACTION:    The auto-retract sensor cannot detect an object farther away than 1/4-inch. A slow-descent cylinder stroke does not sustain enough momentum to reach the sensed product. If this is the case, increase the tamp dwell by no more than 10 ms. at a time until the tamp pad consistently applies labels to all products.

**Possible Cause:**    **Cylinder air pressure set too low.**

ACTION:    Set the tamp air pressure regulator to 20-40 psi.

**Possible Cause:**    **Cylinder airflow control is set incorrectly.**

ACTION:    Review Section 5.4.1.

**Problem:**      ***Label does not adhere properly***

**Possible Cause:**    **Tamp-pad is not parallel to the product surface.**

ACTION:    Set the tamp pad so it can make parallel contact with the product by adjusting the chassis yoke. See Step 4 in Section 5.4.1.

**Possible Cause:**    **Tamp dwell time set too low.**

ACTION:    The tamp dwell time must be greater than 30 ms to extend the cylinder. If the dwell time is less than 30 ms, increase the value no more than 10 ms at a time. Adjust the dwell-time using the procedure described in Section 5.4.2.

**Possible Cause:**    **Irregular product surface.**

ACTION:    Adjust the product orientation or the system orientation to apply labels on a flat and solid surface of the product.

**Possible Cause:**    **Cylinder air pressure set too low.**

ACTION:    Adjust the tamp air regulator to 20-40 psi.

**Possible Cause:**    **Cylinder airflow control is set incorrectly.**

ACTION:    Review Section 5.4.1.

**Possible Cause:** Vacuum pressure set too high

**ACTION:** Adjust the vacuum pressure.

**Possible Cause:** Label adhesive is not aggressive enough

**ACTION:** Call Diagraph for recommended label stock for your application.

**Problem:** *The cylinder extends but does not retract right way.*

**Possible Cause:** Auto-retract sensor disabled

**ACTION:**

1. Determine if the auto-retract sensor should be enabled or disabled.
2. If the sensor is to be enabled but is disabled, determine why it has been changed. If the sensor was disabled as a test or by mistake, enable the auto-retract sensor.
3. If the sensor should be disabled, reduce the dwell time to limit the cylinder stroke distance.
4. Carefully re-examine the above operation before running the conveyor.

**Possible Cause:** Auto-retract sensor is enabled but the tamp dwell time is too long

**ACTION:**

1. Since the tamp dwell delays retraction, it also delays the auto-retract sensor's product detection. To compensate, reduce the tamp dwell by no more than 10 ms at a time.
2. Carefully re-examine the above operation before running the conveyor.

**Possible Cause:** Auto-retract sensor is not properly sensing the product

**ACTION:** The auto-retract sensor is a light-reflective device that may not be able to detect transparent products such as shrink-wrap or have difficulty sensing light from a rough surface. Adjust the product orientation or system orientation to apply labels on the best available product surface.

**Possible Cause:** Cylinder rods are bent

**ACTION:** Determine what caused the cylinder to bend and call Diagraph Service for replacement cylinder kit (6150-830 for a 6-inch cylinder assembly, 6150-831 for 12-inch cylinder assembly and 6150-832 for an 18-inch cylinder assembly).

**Possible Cause:** Loss of cylinder air pressure.

**ACTION:** Check that the OSHA valve is ON.

**Possible Cause:** Auto-retract turned off on the Hand-Held terminal.

**ACTION:** Enable the auto-retract on the Hand-Held.

**Possible Cause: Auto-retract sensor sitting even with or below the tamp pad.**

ACTION:    1.     Check that the auto-retract sensor is not damaged.  
              2.     Check that the auto-retract sensor is positioned above, but not more than ¼ inch higher than the bottom of the tamp pad. See Section 5.4.5.

**Possible Cause: Substrate is too dark for the sensor to read its reflected beam.**

ACTION:    Choose a lighter substrate.

**Possible Cause: Label may be misaligned on the tamp pad.**

ACTION:    Make sure the tamp pad is parallel to the product. See Section 5.4.1, step 4. Auto-retract sensor may not be set correctly. See Section 5.4.5.

**Possible Cause: Dirt contaminates the sensor.**

ACTION:    Clean the photosensor lens with a soft-tipped swab and isopropyl alcohol.

**Possible Cause: Faulty sensor or sensor cable.**

ACTION:    Replace the sensor or sensor cable.

**Problem: Auto-retract does not work.**

**Possible Cause: Auto-retract not ON on the hand-held.**

ACTION:    Turn auto-retract ON.

**Possible Cause: Auto-retract sensor is saturated.**

ACTION:    Shade the PA/4000 from all ambient light

**Possible Cause: Auto-retract sensor is out of its focal range.**

ACTION:    Align the tamp cylinder with the product by extending the tamp cylinder until the tamp pad makes contact with the product, or rotate the yoke until the pad lays flat against the product. See Sections 5.4.1 and 5.4.5.

**Possible Cause: Voltage is wrong.**

ACTION:    Check the voltage between the 9 and 7 pins on the J5 sensor cable plug on the connector board. It should read 5VDC. If it doesn't, try a new connector cable between connector board and the applicator board. Recheck 9 and 7 voltage.

**Possible Cause: Ground is bad or voltage on pin 12 on chip U10 is wrong.**

ACTION:    Ground and check the voltage at pin 12 on chip U10 on the applicator board. With the retract sensor uncovered it should

read 5VDC. With paper under the retract sensor it should read under 1/2 V.

**Possible Cause: Applicator board is bad.**

ACTION: If there is still no voltage, replace the applicator board.

**Problem: Label applied too early.**

**Possible Cause: Photosensor distance is set too short.**

ACTION:

1. Carefully measure the distance from the peel blade to Photosensor 1.
2. Verify the photosensor distance setting. Change if incorrect.
3. Carefully re-examine the above operation before running the conveyor.

**Possible Cause: Incorrect setting for the photosensor type.**

ACTION:

1. Determine the type of photosensor you are using as Photosensor 1.
2. Carefully re-examine the above operation before running the conveyor.

**Possible Cause: Incorrect setting for the photosensor edge.**

ACTION:

1. Determine which edge you want to use to sense the product (leading or trailing).
2. Verify Photosensor 1 edge setting.
3. Carefully re-examine the above operation before running the conveyor.

**Possible Cause: Product Delay distance set too short.**

ACTION:

1. Increase the product delay time by following the directions in Section 5.4.4.
2. Run sample labels to determine the change in label placement.
3. If necessary, continue to increase the product delay in small increments until the labels are applied correctly on the product.

**Possible Cause: Incorrect product detection by Photosensor 1.**

ACTION:

1. Check the cable connection between the photosensor and PA/4000 connection.
2. Clean the photosensor lens with a soft-tipped swab and isopropyl alcohol.
3. Adjust and direct Photosensor 1 at the product.
4. Adjust the sensing distance of the photosensor with the potentiometer at the rear of the photosensor.

5. Carefully re-examine the above operation before running the conveyor.

**Problem:**      **Label applied too late.**

**Possible Cause:**    **Photosensor distance set too long.**

- ACTION:
1. Carefully measure the distance from the peel blade to Photosensor 1.
  2. Adjust the sensing distance of the photosensor with the potentiometer at the rear of the photosensor.
  3. Carefully re-examine the above operation before running the conveyor.

**Possible Cause:**    **Incorrect setting for the photosensor edge.**

- ACTION:
1. Determine which edge you want to use to sense the product: leading or trailing.
  2. Verify Photosensor 1 edge setting in hand-held. Alter if necessary.
  3. Carefully re-examine the above operation before running the conveyor.

**Possible Cause:**    **Product delay distance set too long.**

- ACTION:
1. Decrease the product delay time.
  2. Run sample labels to determine the change in label placement.
  3. If necessary, continue to decrease the product delay in small increments until the labels are applied correctly on the product.

**Possible Cause:**    **Incorrect product detection by Photosensor 1.**

- ACTION:
1. Photosensor 1 may be detecting extraneous movement such as people or equipment moving near the conveyor.
  2. Clean the photosensor lens with a soft-tipped swab and isopropyl alcohol.
  3. Adjust and direct Photosensor 1 at the product.
  4. Adjust the sensing distance of the photosensor with the potentiometer on the back of the photosensor.

**Possible Cause:**    **Cylinder airflow control is set incorrectly.**

- ACTION:
- See Section 5.4.1.

**Possible Cause:**    **Tamp air pressure set too low**

- ACTION:
- Increase the tamp air pressure.

**Possible Cause: Cylinder rods are bent**

**ACTION:** Determine what caused the cylinder to bend and call Diagraph Service for replacement cylinder kit (6150-830 for 6-inch cylinder assembly, 6150-831 for 12-inch cylinder assembly, or 6150-832 for 18-inch cylinder assembly).

**Problem: Inconsistent label placement.**

**Possible Cause: Inconsistent conveyor line-speed reading**

**ACTION:**

1. Check the drive belt tension.
2. Check the edge sensor voltage.

**Possible Cause: Inconsistent product detection by Photosensor 1.**

**ACTION:**

1. Check the cable connection between the photosensor and PA/4000 connection.
2. Clean the photosensor lens with a soft-tipped swab and isopropyl alcohol.
3. Adjust and direct the Photosensor 1 at the product.
4. Adjust the sensing distance of the photosensor by turning its potentiometer clockwise.

**Possible Cause: Label is not adhering correctly.**

**ACTION:**

1. If the label placement is skewed, adjust the yoke so that the tamp is parallel with the product.
2. If the labels are not adhering firmly to the product due to inadequate tamp pressure, increase the tamp pressure.
3. If the label stock is incorrect, call Diagraph to order correct label stock.

**Possible Cause: Cylinder rods are bent**

**ACTION:** Determine what caused the cylinder to bend and call Diagraph Service for replacement cylinder kit (6150-830 for 6-inch cylinder assembly, 6150-831 for 12-inch cylinder assembly, or 6150-832 for 18-inch cylinder assembly).

**Problem: PA/4000 not applying labels on every product.**

**Possible Cause: Photosensor distance set too short**

**ACTION:**

1. Carefully measure the distance from the peel blade to Photosensor 1.
2. Verify the photosensor distance setting. Change if incorrect.
3. Carefully re-examine the above operation before running the conveyor.

**Possible Cause: Conveyor line-speed too fast**

**ACTION:** Conveyor line speed must be slowed to a speed that falls within the printing capability of the print engine.

**Possible Cause: Photosensor distance is too long**

- ACTION:**
1. Move the photosensor closer to the print engine peel blade.
  2. Measure the distance from the peel blade to the photosensor.
  3. Adjust the sensing distance of the photosensor by turning its potentiometer clockwise.
  4. Carefully re-examine the above operation before running the conveyor.

**Possible Cause: Intermittent product detection**

- ACTION:**
1. Check the cable connection between the photosensor and connection J2 on the back of the print engine.
  2. Clean the photosensor lens with a soft-tipped swab and isopropyl alcohol.
  3. Adjust and direct the Photosensor 1 at the product.
  4. Adjust the sensing distance of the photosensor with the potentiometer on the back of the photosensor.

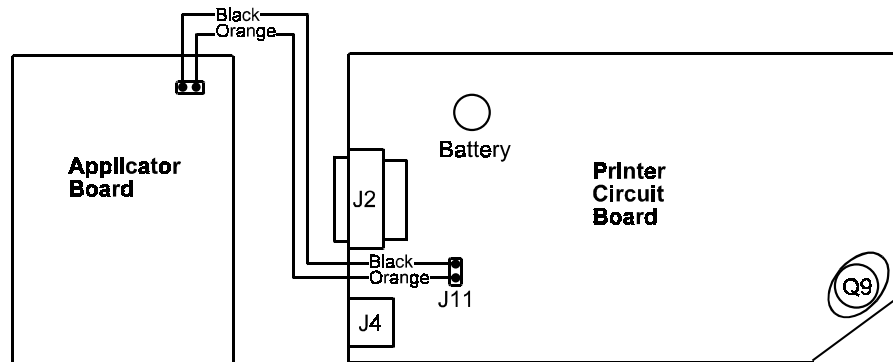
**Possible Cause: Print speed set too slow.**

**ACTION:** Increase the print speed of your print engine.

**Problem: PA/4000 feeds label correctly, but will not tamp.**

**Possible Cause: Cutter cable from applicator board to J11 on the circuit board is not connected in the correct orientation.**

**ACTION:** Make sure cables are connected as shown:

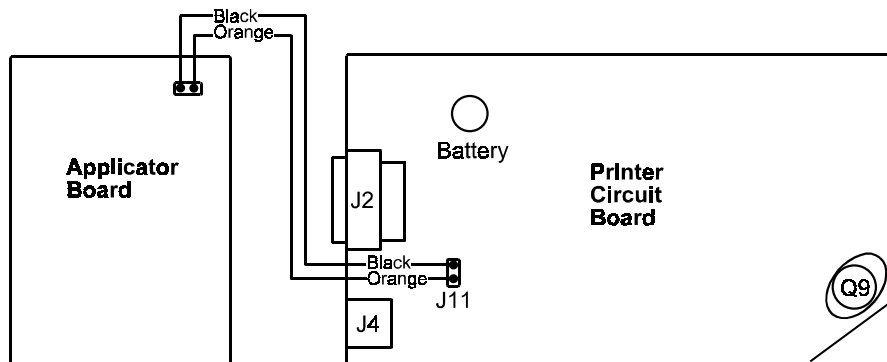




**Problem:**      **PA/4000 feeds too many labels at a time and air assist will not shut off.**

**Possible Cause:** Cutter cable from applicator board to J11 on the circuit board is not connected in the correct orientation.

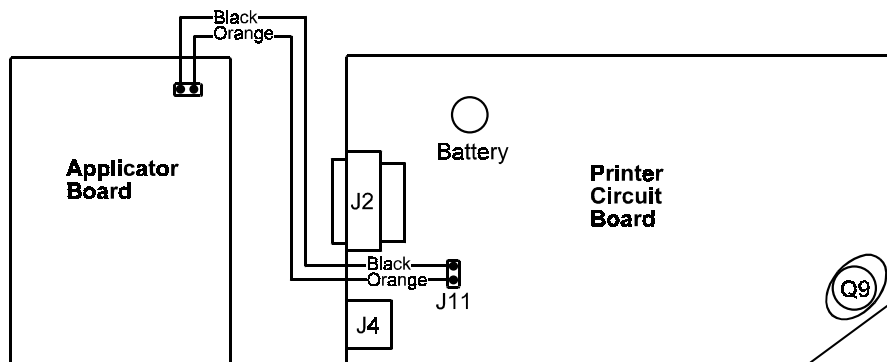
**ACTION:**      Make sure cables are connected as shown:



**Problem:**      **Label appear to be thrown off the tamp.**

**Possible Cause:** Cutter cable from applicator board to J11 on the circuit board is not connected in the correct orientation.

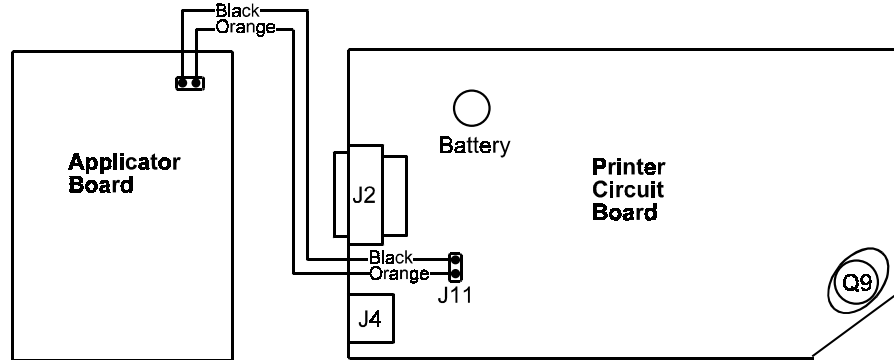
**ACTION:**      Make sure cables are connected as shown:



**Problem:**      **After PA/4000 dispenses a label, air assist will not shut off for 5 seconds.**

**Possible Cause:** Cutter cable from applicator board to J11 on the circuit board is not connected in the correct orientation. Once the air assist shuts off, the tamp cylinder applies the label on the pad to the next product.

ACTION: 1. Make sure cables are connected as shown:



2. If this doesn't work, replace the Prodigy Plus™ board.

**Problem:**      **Performance Series Software appears to have a Lost Batch**

**Possible Cause:**    **A failed label is in the printer.**

ACTION: 1. The batch is not lost, remove the failed label and the PA/4000 will print and apply the entire batch.

## 10.5 Error and Warning Messages

The LCDs on the Hand-Held Terminal reports both error and warning messages. An error message appears when:

- The system can not print or apply
- The safety of the system is in jeopardy
- The performance of the system is not ideal

A warning message appears when:

- The system needs new supplies
- The system needs to describe an event that did not take place

With the optional warning tower, a red light indicates an error, and a yellow light indicates a warning. When an error and a warning occur simultaneously, only the red lamp lights.

A table of error messages appears below:

Condition	Warning Tower			Hand-Held Terminal				
	Green	Yellow	Red	Power LED	Label LED	Ribbon LED	Error LED	Display
Label Low	Off	Flash	Off	On	Flash	Off	Off	Label Low
Label Low/Ribbon out	Off	Off	Flash	On	Flash	Flash	On	Ribbon Out
Label Low/Pause	Flash	On	Off	On	Flash	Off	Flash	Printer Paused
Label low/Cylinder Error	Off	Off	Flash	On	Flash	Off	Flash	Cylinder Error
Label low/Printer Error	Off	Off	Flash	On	Flash	Off	Flash	Printer Error
Ribbon Low	On	Flash	Off	On	Off	Flash	Off	Ribbon Low
Ribbon Low/Label Low	On	Flash	Off	On	Flash	Flash	Off	Ribbon Low
Ribbon Low/Pause	Flash	On	Off	On	Off	Flash	Flash	Printer Paused
Ribbon Low/Cylinder Error	Off	Off	Flash	On	Off	Flash	Flash	Cylinder Error
Ribbon Low/Printer Error	Off	Off	Flash	On	Flash	Flash	Flash	Printer Error
Ribbon Out	Off	Off	Flash	On	Off	Flash	On	Ribbon Out
Ribbon Out/Cylinder Error	Off	Off	Flash	On	Off	Flash	On	Ribbon Out
Pause	Flash	On	Off	On	Off	Off	Flash	Printer Paused
Cylinder Error	Off	Off	Flash	On	Off	On	Flash	Cylinder Error
Printer Error	Off	Off	Flash	On	Flash	Off	Flash	Printer Error
Ribbon Low/Label Low/ Pause	Flash	On	Off	On	Flash	Flash	Flash	Printer Paused
Ribbon Low/Label Low/ Cylinder Error	Off	Off	Flash	On	Flash	Flash	Flash	Cylinder Error
Ribbon Low/Label Low/ Printer Error	Off	Off	Flash	On	Flash	Flash	Flash	Printer Error

# APPENDIX A

## ASCII Control Code Chart

Code page 850. 1–127 available characters printed.

	Char	Dec	Hex
Ctrl @	NUL	0	00
Ctrl A	SOL	1	01
Ctrl B	STX	2	02
Ctrl C	EXT	3	03
Ctrl D	EOT	4	04
Ctrl E	ENQ	5	05
Ctrl F	ACK	6	06
Ctrl G	BEL	7	07
Ctrl H	BS	8	08
Ctrl I	HT	9	09
Ctrl J	LF	10	0A
Ctrl K	VT	11	0B
Ctrl L	FF	12	0C
Ctrl M	CR	13	0D
Ctrl N	SO	14	0E
Ctrl O	SI	15	0F
Ctrl P	DLE	16	10
Ctrl Q	DC1	17	11
Ctrl R	DC2	18	12
Ctrl S	DC3	19	13
Ctrl T	DC4	20	14
Ctrl U	NAK	21	15
Ctrl V	SYN	22	16
Ctrl W	ETB	23	17
Ctrl X	CAN	24	18
Ctrl Y	EM	25	19
Ctrl Z	SUB	26	1A
Ctrl [	ESC	27	1B
Ctrl \	FS	28	1C
Ctrl ]	GS	29	1D
Ctrl ^	RS	30	1E
Ctrl _	US	31	1F

Char	Dec	Hex
	32	20
!	33	21
“	34	22
#	35	23
\$	36	24
%	37	25
&	38	26
'	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F

Char	Dec	Hex
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	D0
Q	81	D1
R	82	D2
S	83	D3
T	84	D4
U	85	D5
V	86	D6
W	87	D7
X	88	D8
Y	89	D9
Z	90	DA
[	91	DB
\	92	DC
]	93	DD
^	94	DE
_	95	DF

Char	Dec	Hex
`	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
	124	7C
}	125	7D
~	126	7E
	127	7F

## ASCII Control Code Chart

Code page 850. 128–255 available characters printed.

Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
Ç	128	80	á	160	A0		192	C0	Ó	224	E0
ü	129	81	í	161	A1		193	C1	ß	225	E1
é	130	82	ó	162	A2		194	C2	Ô	226	E2
â	131	83	ú	163	A3		195	C3	Ò	227	E3
ä	132	84	ñ	164	A4		196	C4	õ	228	E4
à	133	85	Ñ	165	A5		197	C5	Õ	229	E5
â	134	86	ª	166	A6	ã	198	C6	µ	230	E6
ç	135	87	º	167	A7	Ã	199	C7	þ	231	E7
ê	136	88	¿	168	A8		200	C8	Ð	232	E8
ë	137	89	®	169	A9		201	C9	Ú	233	E9
è	138	8A		170	AA		202	CA	Û	234	EA
ï	139	8B	½	171	AB		203	CB	Ü	235	EB
î	140	8C	¼	172	AC		204	CC	Ý	236	EC
ì	141	8D	¡	173	AD		205	CD	Ý	237	ED
Ã	142	8E		174	AE		206	CE		238	EE
Å	143	8F	-	175	AF		207	CF		239	EF
É	144	90		176	B0	Ò	208	D0		240	F0
æ	145	91		177	B1	Ð	209	D1	±	241	F1
Æ	146	92	²	178	B2	Ê	210	D2		242	F2
ô	147	93	³	179	B3	Ë	211	D3	¾	243	F3
ö	148	94	´	180	B4	È	212	D4		244	F4
ò	149	95	Á	181	B5		213	D5		245	F5
û	150	96	Â	182	B6	Í	214	D6	÷	246	F6
ù	151	97	À	183	B7	Î	215	D7	,	247	F7
ÿ	152	98	©	184	B8	Ï	216	D8	°	248	F8
Ö	153	99	¹	185	B9		217	D9	“	249	F9
Ü	154	9A		186	BA		218	DA	.	250	FA
ø	155	9B	»	187	BB		219	DB		251	FB
£	156	9C		188	BC		220	DC		252	FC
Ø	157	9D	€	189	BD		221	DD		253	FD
×	158	9E	¥	190	BE	Ì	222	DE		254	FE
f	159	9F		191	BF		223	DF		255	FF

## APPENDIX B

### Cable and Pin connections

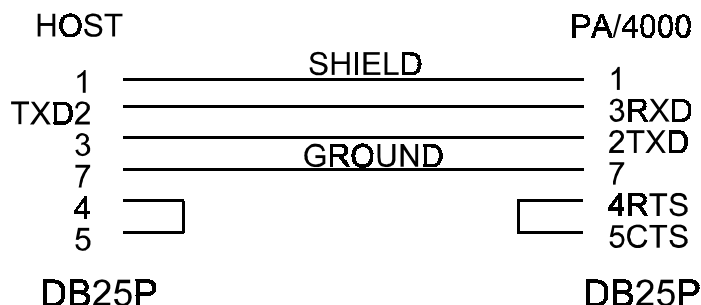
For most applications, the interface between the Prodigy Plus™ and the PC will be RS-232C. The cable needed to connect the printer to the PC will be either a straight through or null modem cable.

### CJ Pin Connections

P i n N u m b e r	C o n n e c t i o n s
1	Chassis
2	TXD (RS-232)
3	RXD (RS-232)
4	RTS (4.7K ohm to +5VDC)
5	CTS (input)
7	Logic Ground
20	Busy (output)
9	T Data + (RS-422)
10	T Data - (RS-422)
18	R Data + (RS-422)
19	R Data - (RS-422)
13	Logic Ground
14	+5VDC (100mA Max.)
25	+9V (unregulated)

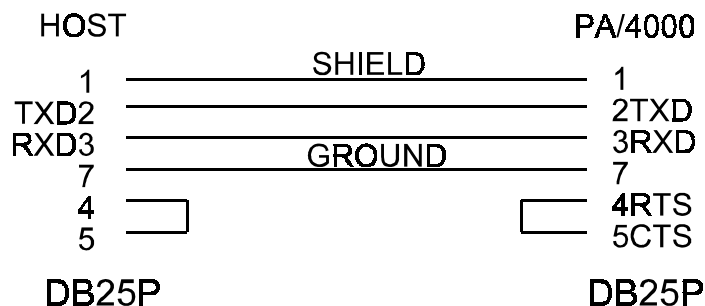
## Cable Connections

### Straight Null Modem Cable (MXM)

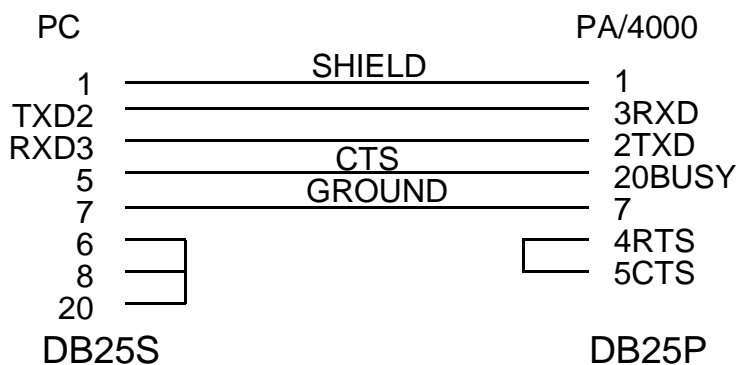


**NOTE:** Cable used for typical connection to other DCE equipment with XON/XOFF flow control.

### Straight Cable (MM)

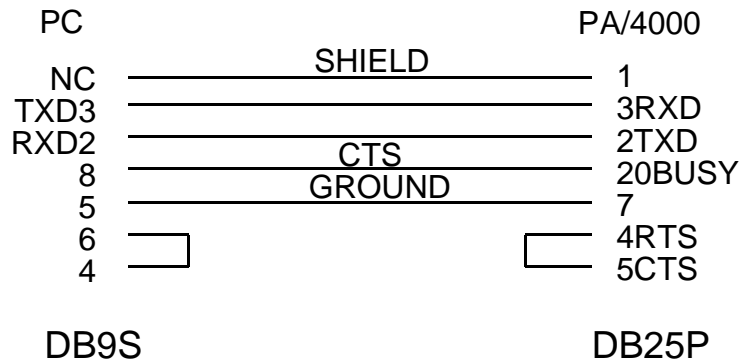


### PC (DB25P) To PA/4000



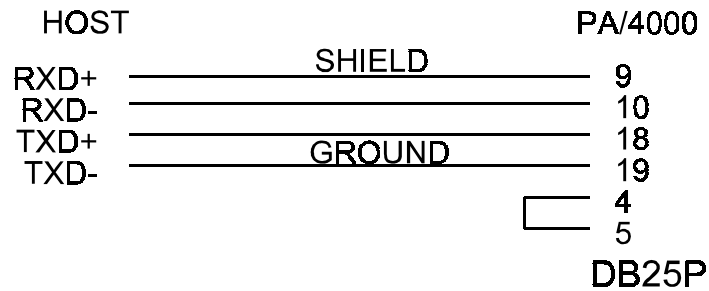
**NOTE:** Cable used for connection to PC compatible with DB25P communication ports. Flow control is either XON/XOFF or CTS/DTR.

### PC (DB9P) to PA/4000



**NOTE:** Cable used for connection to PC compatible with DB25P communication ports. Flow control is either XON/XOFF or CTS/DTR.

### RS-422 Connection





## APPENDIX C

### PA/4000 Remote I/O (P/N 6100-121) Configuration

This section covers the configuration and usage of the Diagraph Remote I/O (RIO) module board in the PA/4000 with an Allen-Bradley PLC. For successful implementation, you should be able to program and operate an Allen-Bradley PLC and be able to program block transfer instructions. You will also need access to the PA/4000 host commands and their parameters.

#### Minimum Requirements

Rack:	One quarter
Power Supply:	Allen-Bradley
PLC:	Allen-Bradley (see the compatibility list in section 5.2.4)
Cables:	Power cable to PLC power supply PLC to Diagraph RIO board-Belden 9463 with Phoenix connectors PC to PLC-RS-232 Optional (Ethernet connection from PC to PLC, useable with A-B PLC model 5/11 or higher)
Controller:	PC with Allen-Bradley 6200, Release 5.0 software or other software capable of programming PLCs.

#### Communication Specifications

##### Cable Type

Use Twinx cable to connect the PLC to the RIO board-Belden 9463 blue PVC jacket cable (Allen-Bradley P/N 1770-CD). Contact Allen-Bradley if other cable is under consideration.

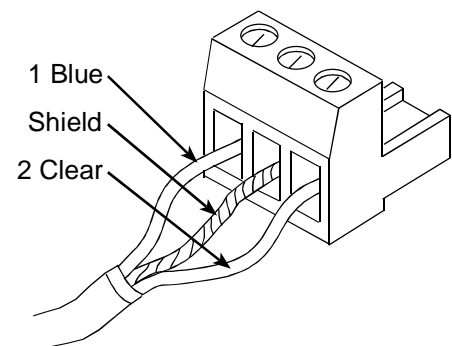
##### Cable Length

Use a minimum of ten feet for all connections. Shorter lengths may cause signal reflections. Maximum lengths depend on the RIO data rate: 10,000 feet for 57.6k bit/s and 5,000 feet for 115.2k bit/s.

Contact Allen-Bradley if you are considering an application that will employ a data rate of 230.4k bit/s.

##### Cable Connections

Use three position MSTB plugs (Phoenix P/N 1754465 or equivalent) for connections to the PLC and to the RIO board. Connect all three conductors-blue, shield and clear-at each wiring point and avoid making additional ground connections to the shield.



## Defaults

### RS-232 Defaults

Switches are set for factory defaults when shipped:

- 9600 baud
- 8 data bits
- 1 stop bit
- no parity
- handshaking is disabled

### Remote I/O Defaults

Rack address	3
Rack size	1/4
Starting quarter	1
Data rate	57.6k bit/s
Last rack	Yes

## A-B Compatible Equipment Table

### Allen Bradley PLC Models

- PLC-5/10
- PLC-5/11B
- PLC-5/12
- PLC-5/15
- PLC-5/20B, 5/20E
- PLC-5/25
- PLC-5/30B
- PLC-5/40B, 5/40L, 5/40E
- PLC-5/60B, 5/60L
- PLC-5/80E

### Allen Bradley SLC Models

Remote I/O is supported on Models SLC5/02 or higher only. In addition, the SLC model that is used must have a Remote I/O Scanner 1747-SN module installed.

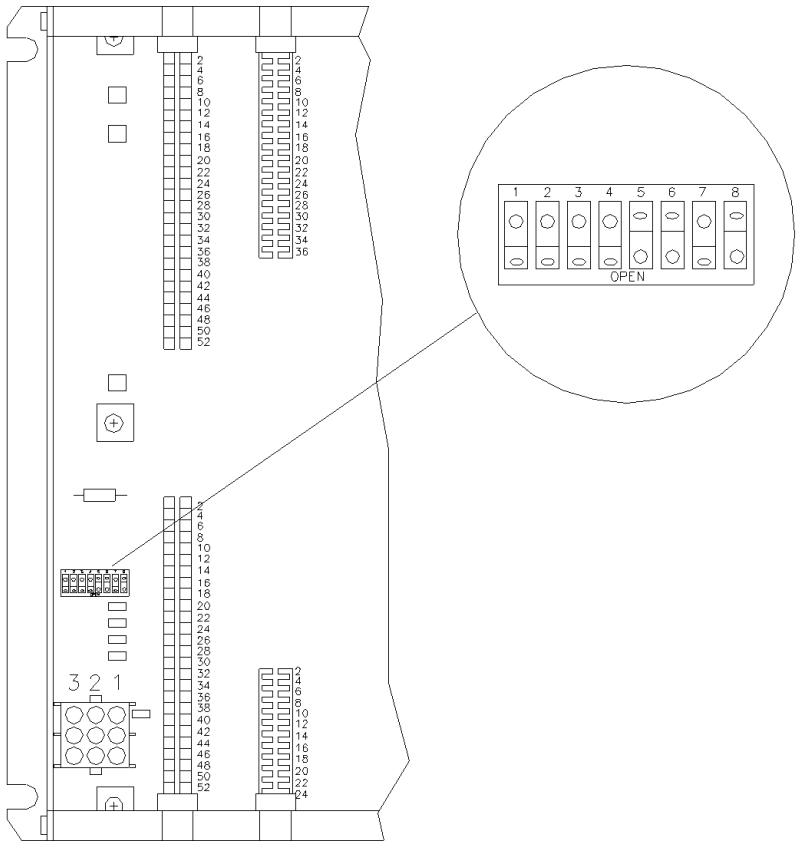
## Configuring the PLC

The instructions in this section cover setting the backplane switches in an Allen-Bradley 1771 I/O chassis and the DIP switches in a PLC. Specifically, they cover the configuration of an Allen-Bradley PLC to run the Diagram sample program through RIO on the PA/4000.

Use a ball-point pen when setting the backplane and PLC switches. Avoid using pencils since pencil points can break off and short switches.

Backplane Chassis Switches

1	2	3	4	5	6	7	8
OFF	OFF	OFF	OFF	ON	ON	OFF	ON



PLC Switches

DIP Switch Bank S1

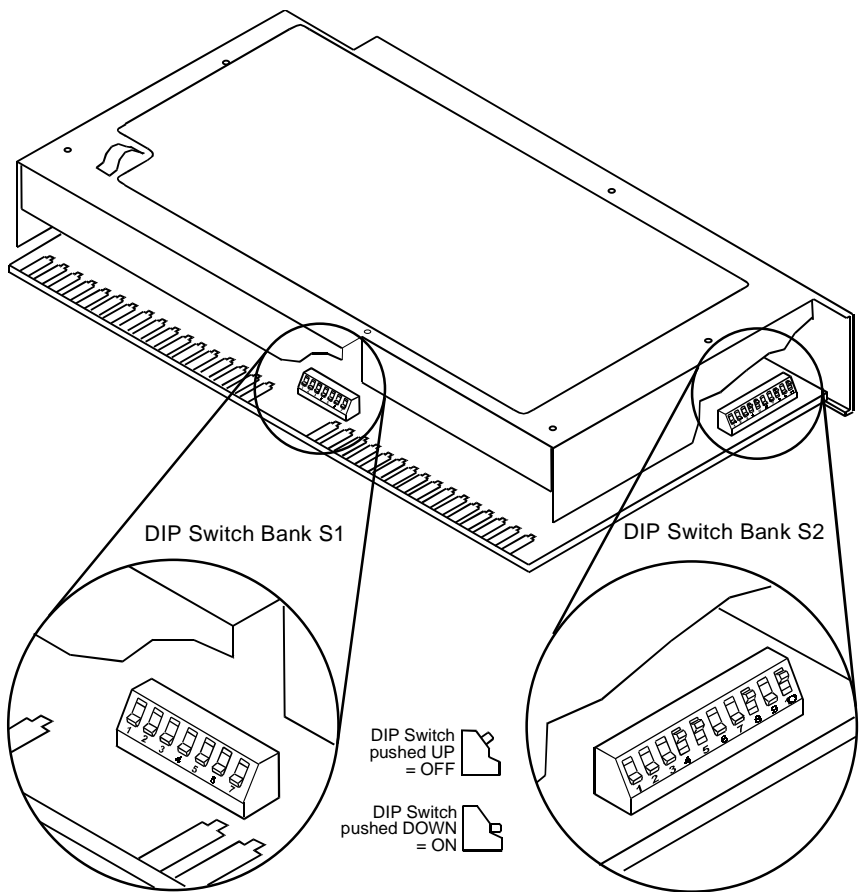
1	2	3	4	5	6	7
ON	ON	ON	ON	ON	ON	OFF

Switch 7 is not used.

DIP Switch Bank S2

	1	2	3	4	5	6	7	8	9	10
<b>RS-232C</b>	ON	ON	ON	OFF	OFF	ON	ON	OFF	ON	OFF
<b>RS-422A</b>	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
<b>RS-423</b>	ON	ON	ON	OFF	OFF	ON	OFF	OFF	ON	OFF

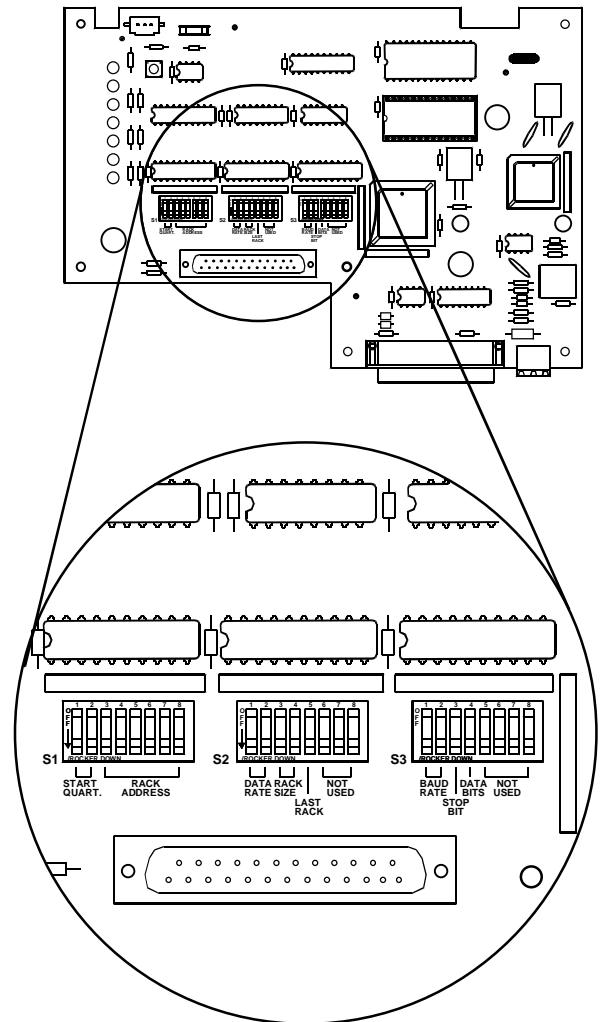
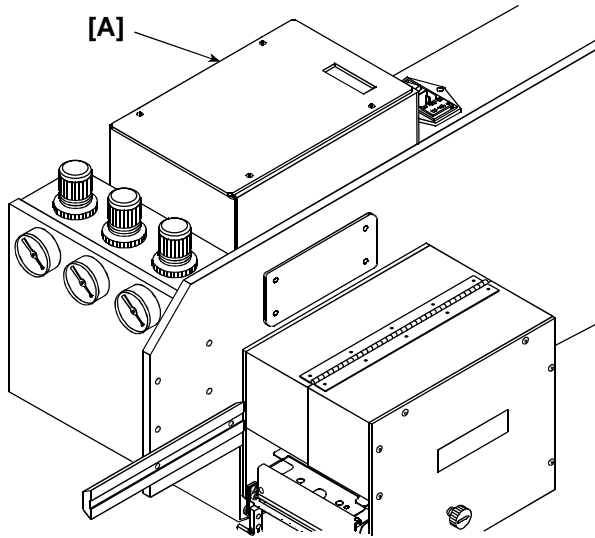
Set the switches in S2 for RS-232C to run the sample program.



## RIO Access and Configuration

### Location

The RIO board is in the RIO box **[A]** located on top of the electrical box.



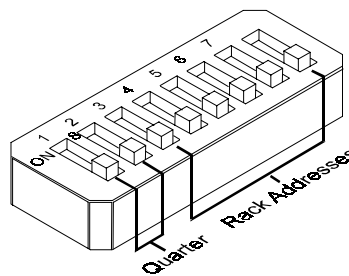
Disconnect the power from the PA/4000 and remove the four screws that secure the top (the plate with the LED status markings). Note the DIP switch positions in the illustration above. Switch settings follow.

## RIO DIP Switch Settings

### DIP Switch Bank S1

DIP switch bank S1 sets both the rack quarter and the rack address. Use the tables below to set the switches to match your PLC configuration. A valid rack address depends on the type of PLC in use. The tables below show available variations. Asterisks mark PA/4000 RIO factory-default settings.

Bit 1	Bit 2	Quarter
ON*	ON*	First Quarter
OFF	ON	Second Quarter
ON	OFF	Third Quarter
OFF	OFF	Fourth Quarter



Bit 3		
ON	OFF*	Rack Address 3

Bit 4	
ON	OFF*

Bit 5	
ON*	OFF

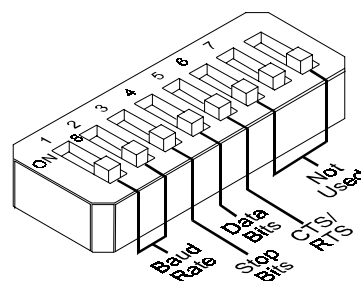
Bit 6	
ON*	OFF

Bit 7	
ON*	OFF

Bit 8	
ON*	OFF

### DIP Switch Bank S2

Bit 1	Bit 2	Quarter
ON*	ON*	57.6 Kbits/sec
OFF	ON	115.2 Kbits/sec
ON	OFF	230.4 Kbits/sec
OFF	OFF	230.4 Kbits/sec



Bit 3	Bit 4	Rack Size
ON*	ON*	Always ON for both bits

Bit 5	Last Rack
ON	Not the last module on this rack
OFF*	Last module on the rack*
Bit 6 - 8	NOT USED

### Bank S3 Switch 3

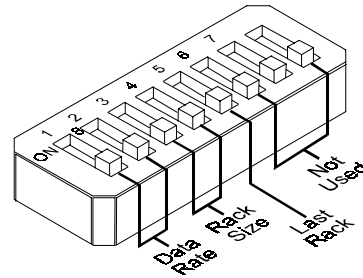
Bit 1	Bit 2	Baud Rate
ON*	ON*	19200 bits/sec
OFF	ON	9600 bits/sec
ON	OFF	2400 bits/sec
OFF	OFF	1200 bits/sec

Bit 3	Stop Bits
ON*	1 Stop bit
OFF	2 Stop bits

Bit 4	Data Bits
ON	7 data bits
OFF*	8 data bits

Bit 5	CTS/RTS
ON	CTS/RTS handshaking enabled
OFF*	CTS/RTS handshaking disabled

Bits 6-8	Not Used
----------	----------



### RIO Status LEDs

The RIO board has seven LEDs that report the status of communications between the PLC and the RIO board. Use the listing below to monitor their signals and identify any irregularities.

Red LED	Indicates a reset. It flashes when a reset occurs and goes out when reset is complete. Normal state is off.
Green LEDs 1 & 4	Signals a handshake. If enabled, they flash during a handshake. If disabled, they remain off. Normal state is off.
Green LEDs 2 & 5	Signals communication to the PLC from the PA/4000. It flashes during send or receive. LED 5 blinks when communication occurs between the RIO board and the controller.
Green LED 3	Indicates when power is on.
Green LED 5	Communication state.
Green LED 6	Indicates the state of the PLC- it stays on steadily when the RIO is in RUN mode and flashes when it is in the PROGRAM mode.

During normal operation, LED 3 and 6 will be on. LED 3 will change to a flash when the system goes into programming mode.

## Message Parameters for RIO

RIO Module drops null characters (ASCII \00).

A message can be up to 64 words or 128 ASCII characters long.

Messages of less than 64 words or 128 ASCII characters need to be padded with null characters-ASCII \00. If null characters are omitted, transmission will not occur.

The RIO uses discrete transfer to send data back to the PLC-not block transfer.

Slot 8 of the first rack indicates data availability. If the data is not read for six seconds, it is lost.

## Sample Program for RIO

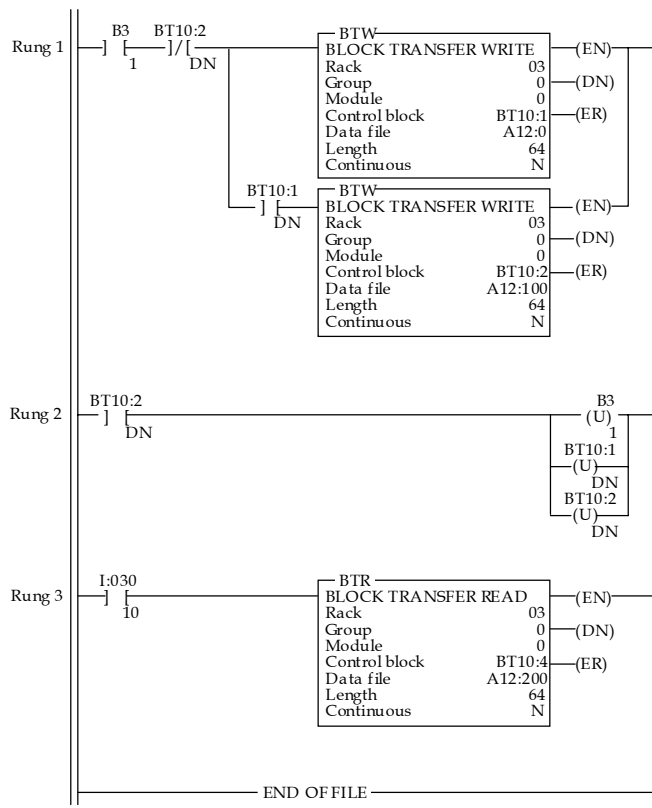
The diskette included with this system has a sample ladder logic program that prints messages with a PA/4000. It can serve as a first step in establishing successful communication between the PA/4000 and the PLC.

## Equipment used to set up Sample Program

The listing below details a configuration verified by Diagraph that successfully ran the Sample Program.

Software	Allen-Bradley's software 6200, Release 5.0
----------	--

PA/4000      Factory installed RIO





## Sample Program 1 Rung-by-Rung

### Rung 1 - Message Creation and Print/ Apply

When B3/1 bit is latched the PLC transmits data to create and print/apply labels:

```
\02(STX)RN      disable ribbon saver
\02(STX)f283     set distance to peel off position to 283
\02(STX)O0188   set from edge offset to 188
\02(STX)V5      set pseudo-switch setting
\02(STX)L       enter label formatting command input mode
D12            set height and width (horizontal dot size 1; vertical dot size 2)
PM            set print speed to 7.0" per second
SO            set slew rate 8.0" per second
H10           set head value to 10
z             zero conversion to "0" to eliminate slash
1h420500040012712345678
                rotation - 1 (0 degrees)
                font - h
                width multiplier - 4
                height multiplier - 2
                bar code height - 050
                row position - 0040
                column position - 0127
                data string - 12345678
141100001000160DIAGRAPH
                rotation - 1 (0 degrees)
                font - 4
                width multiplier - 1
                height multiplier - 1
                bar code height - 000
                row position - 0100
                column position - 0160
                data string - DIAGRAPH
10310000024016512345678
                rotation - 1 (0 degrees)
                font - 0
                width multiplier - 3
                height multiplier - 1
                bar code height - 000
                row position - 0024
                column position - 0165
                data string - 12345678
:0001         set cut-by amount to 1
W            wait mode
Q0001        set quantity of print to label to 1
E            terminate label formatting mode and print label
```

Rung 2 - When the transfers in rung 2 are complete, the B3/2 bit is automatically unlatched (set back to 0).

Rung 3 - When the Remote I/O Module receives data from the PA/4000 that needs to be transmitted back to the PLC, it sets a discrete bit. When the module resides on Rack Address 3 Group 0, that bit is I:030/10. When this bit is set by the module, the PLC will poll data from the module and write the data to file A12, location 200. Any data located at that position will be overwritten.

Data Table Report			PLC -5/11		File PA/4000				Data Table File A12:0	
Address	0	1	2	3	4	5	6	7	8	9
A12:0	\02 M	3 0	0 0	\0D\00	\02 R	N \0D	\02 F	2 8	3 \0D	\02 O
A12:10	0 1	8 8	\0D\02	V 5	\0D\00	\00\0D	\02 L	\0D D	1 2	\0D P
A12:20	M \0D	8 0	\0DH	1 0	\0D z	\0D\00	1 h	4 2	0 5	0
A12:30	0 4	0 0	1 2	7 1	2 3	4 5	6 7	8 \0D	1 4	1 1
A12:40	0 0	0 0	1 0	0 0	1 6	0 D	1 A	G R	A P	H \0D
A12:50	1 0	3 1	0 0	0 0	0 2	4 0	1 6	5 1	2 3	4 5
A12:60	6 7	8 \0D	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00
A12:70	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00
A12:80	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00
A12:90	\00\00	\00\00	\00\00Q\	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00
A12:100	: 0	0 0	w \0D	Q 0	0 0	1 \0D	0 0	E \0D	\00\00	\00\00
A12:110	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00	\00\00

As you can see in the Data Report above, a null character \00 will be ignored by the Remote I/O Module. Note that filling the data table with null characters enables you to insert additional new data later and not have to relocate existing data.

## Running the Program

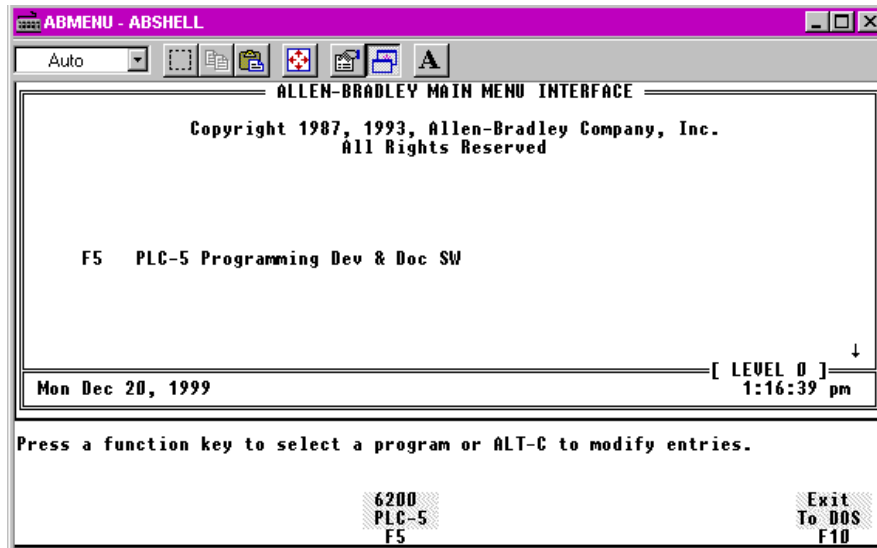
Reconnect the power cord to the PA/4000. Do not replace the cover of the PA/4000 until after a successful run of the Sample Program.

Diskette 5700-315 has a sample program that was developed with Allen-Bradley 6200 software.

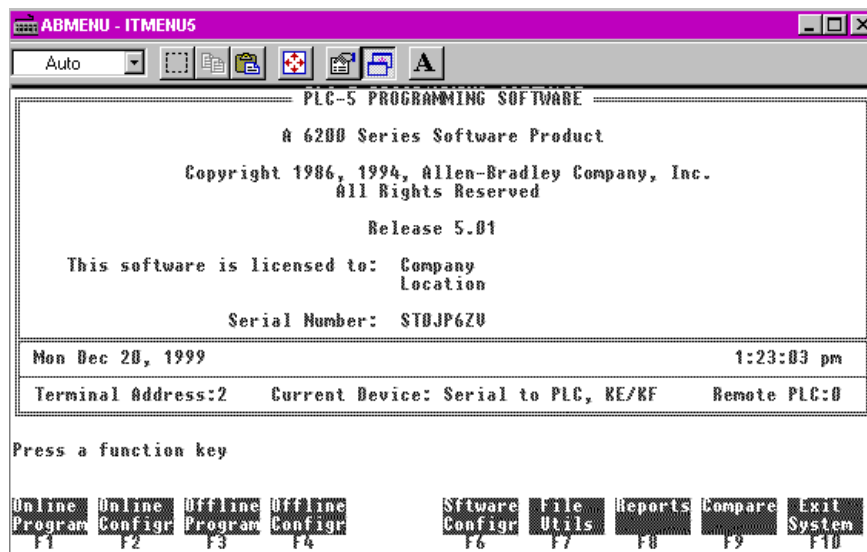
Copy the PA/4000 files on the diskette to C:\IPDS\ARCH\PLC5\.

## Starting Allen-Bradley 6200 Software

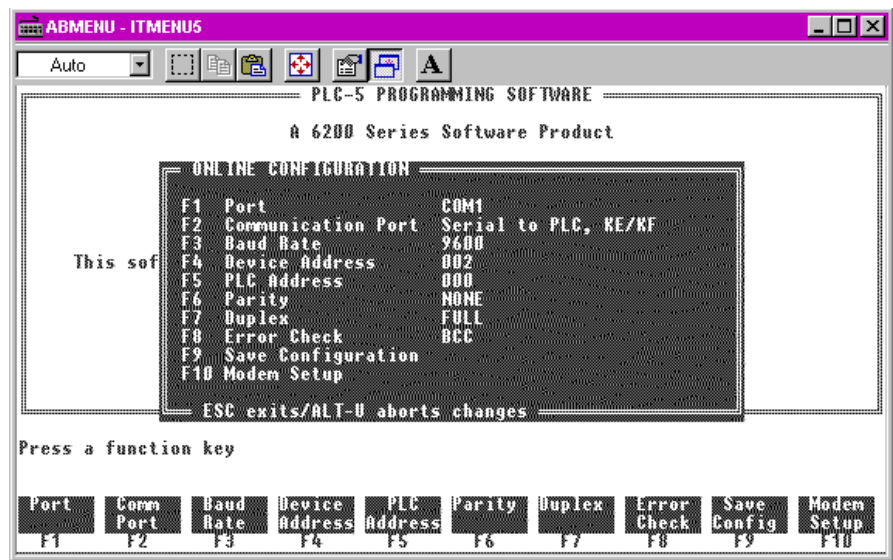
1. Set the current directory to \IPDS.
2. Type **ABMENU** and press Enter. The MAIN MENU appears.



3. Press F5 to choose PLC-5. The PLC-5 Programming Software menu appears.



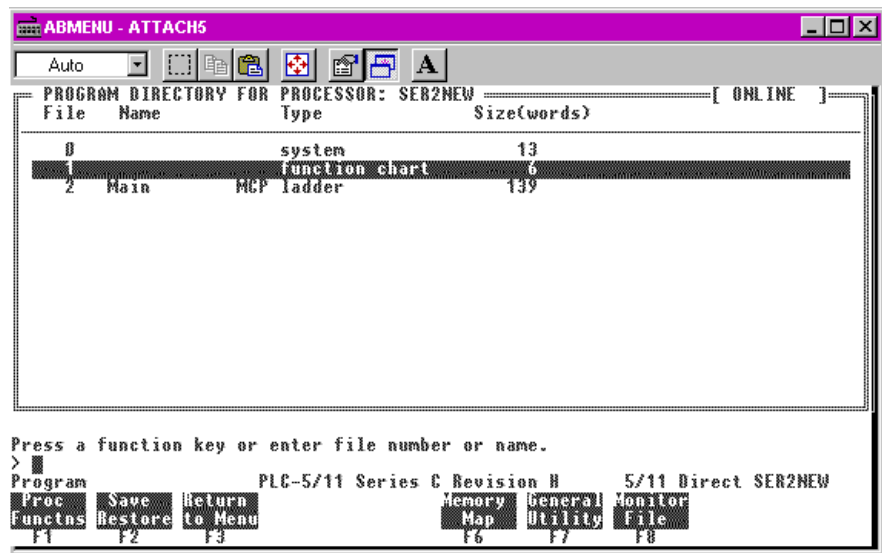
4. Press F2 for Online Configuration



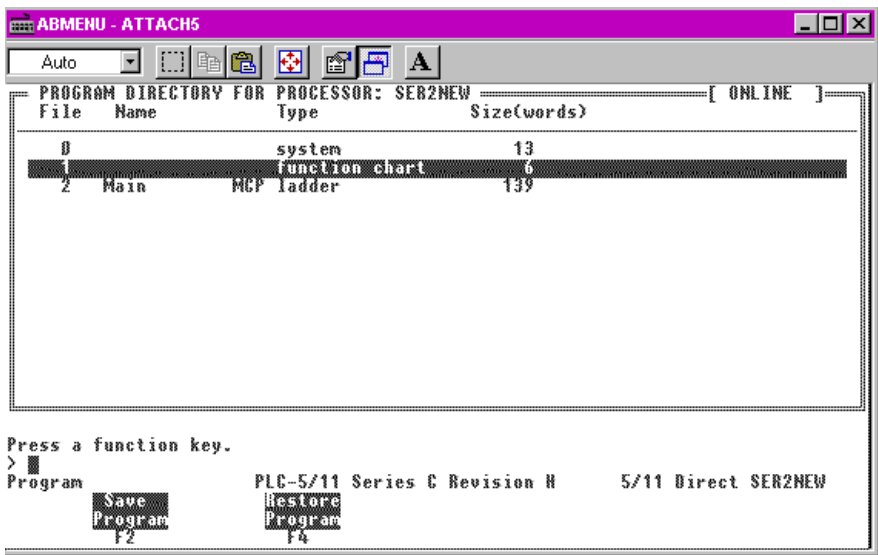
5. Use the function keys and change the configuration parameters to match those shown in the screen sample above.
6. Save the configuration with F9.
7. Press ESC to return to the PLC Programming menu.

### Program Directory for Processor

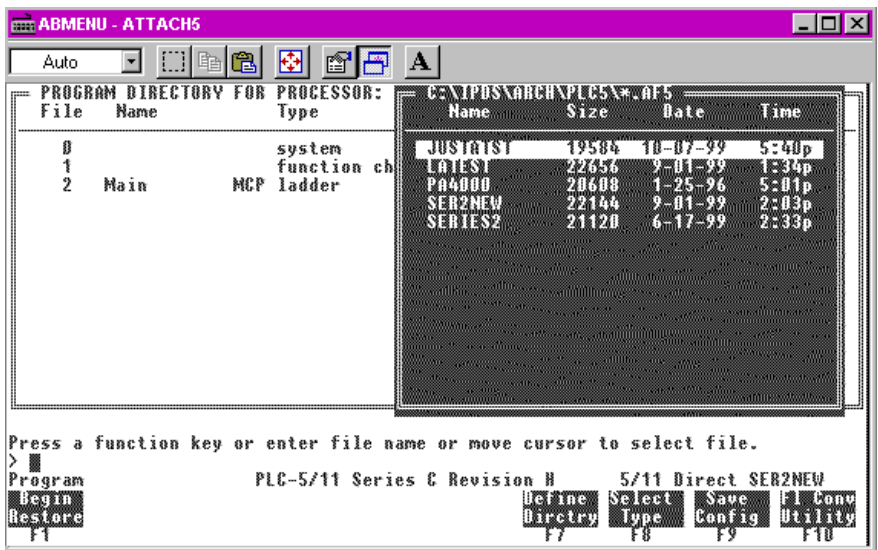
1. Press F1 to access the Program Directory.



2. Press F2 for Save/Restore.

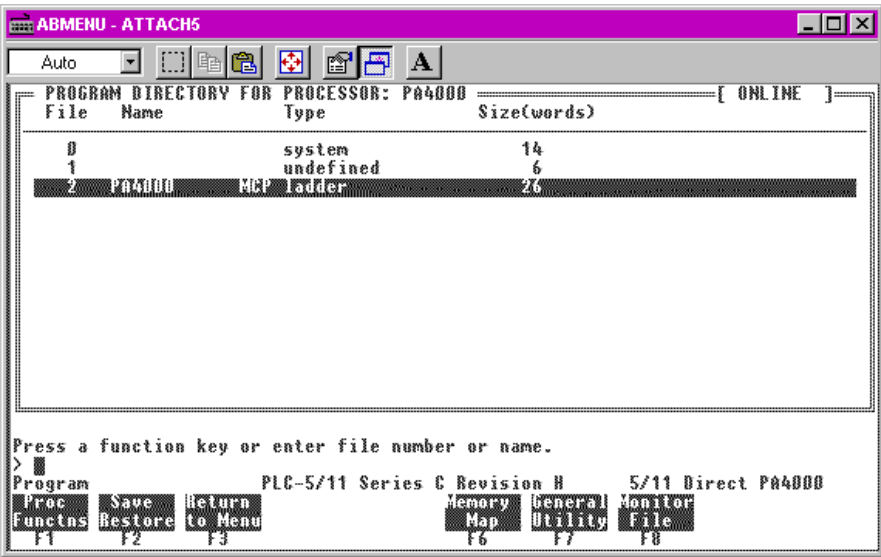


3. Press F4 to start the Restore Program process.

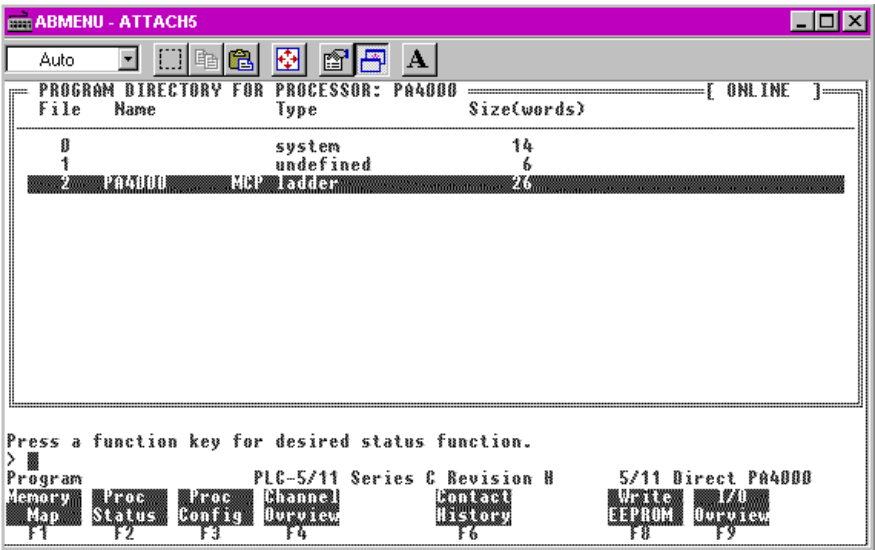


4. Select "PA4000" with the arrow keys.

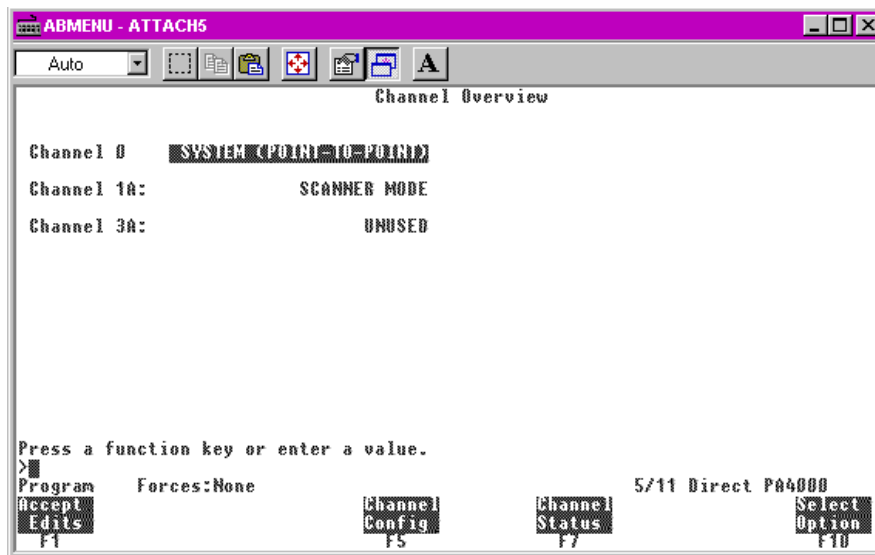
5. Press F1 to begin the restore process.



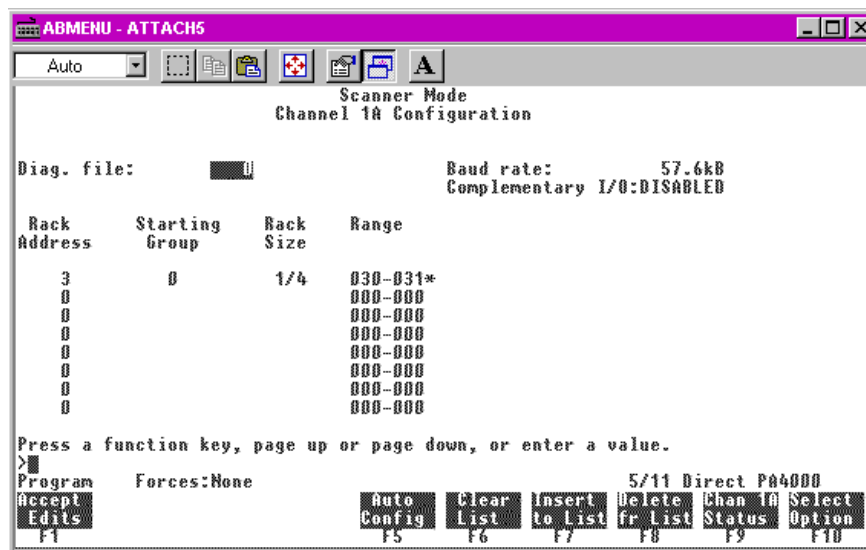
6. Press F7 for General Utility.



7. Press F4 for Channel Overview.



8. Use the arrow keys to pick Channel 1A.

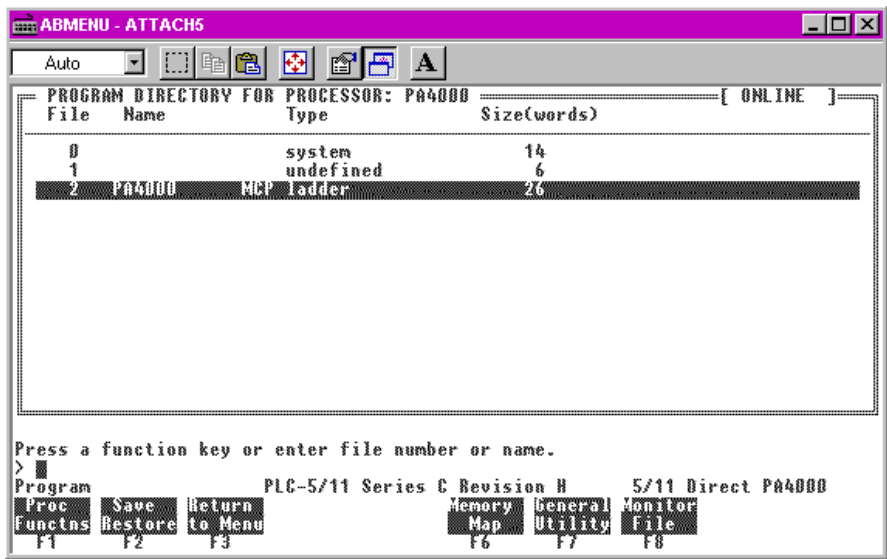


9. Press F5 for the Configuration Menu and set the variables as shown below:

Rack Address      3  
Starting Group    0  
Rack Size        1/4

The range will automatically change to 030-031

10. Press ESC three times to return to the Program Directory for Processor.



11. Press F8 for the Monitor File.



## APPENDIX D

### REPLACEABLE COMPONENTS AND MEDIA SUPPLIES

Replaceable components and media supplies can be ordered from Diagraph. To order call 1-800-521-3047.

#### Replaceable Components

Part Number	Component Description
1770-078	Regulator
1770-036	Gauge
2801-828	Dampener spring
2801-827	Dampener pulley
2801-822	48GR timing pulley
2801-817	Label assist roller
2801-811	Rectifier bridge
2801-811	Rectifier bridge
2801-759	Spring 1" rewind retrofit
2801-758	Hub flat spring 1" core
2801-638	Spring
2801-637	Supply tension spring
2801-635	Head adjust spring
2801-590	Spring washer
2804-321ASV322	PC board assy. Prodigy Plus, Mod.
2804-320	Prodigy Plus CE front panel cable assy.
2801-131	Prodigy Plus slip pulley
2801-130	Friction ribbon disk
2801-033	Label drive roller
2801-022	Prodigy Plus Printhead
5700-216	Photocell Assembly
6105-593	Xmas tree hole plug
6105-592	Bridge cable assembly
6105-535	Cylinder switch cable assembly
6105-534	Long tamp pad sensor cable assembly
6105-533	Short tamp pad sensor cable assembly
6105-391	Transformer assembly
6105-386	Printhead cable jig
6105-384	+24V regulator assembly
6105-383	Fuse, 2.0 AMP
6105-367	Clutch and pulley assembly
6105-296	Low label sensor
6105-276	Blow tube assembly
6105-260	Hand-Held controller
6105-124	Vacuum unit
6105-123	24VDC valve
6105-119	Applicator board
6105-117	Retainer belt
6105-066	Collar spring 5/8 in. I.D.
6105-064	Rewind driver pulley
6105-063	Ribbon drive belt
6105-062	Paper drive belt

## Replaceable Components Continued

Part Number	Component Description
6105-322	Vacuum filter cartridge
6105-061	Rewind belt
6105-050	Stepper motor cable assembly
6105-048	Transformer cable assembly
6105-047	Label low sensor cable assembly
6105-046	Paper edge sensor cable assembly
6105-045	Ribbon sensor cable assembly
6105-036	Peel blade
6105-026	Pinch roller spring
6600-202	Heat sink compound
7501-021	Filter replacement element

## Media Supplies

### Labels

Diagraph recommends its LTS line of labels for thermal transfer printing, and its ATS line for direct-thermal printing. Stock sizes can range from 2 inches (50.8 mm) wide by 1 inch (25.4 mm) long to 4.5 inches (114.3 mm) wide to 13.00 inches (330.2 mm) long, printable area 4.1 inches left justified. LTS labels are made from a coated, thermal transfer facestock, which readily accepts ribbon transfer. Labels are sold in full case quantities only.

ATS labels are made from a premium thermal face sheet for optimum environmental resistance. They are designed to provide excellent print contrast when printing bar codes.

Label edge sensing is carried out by an adjustable photosensor. This sensor locates the leading edge of a label, by measuring the level of opaqueness. You can move it left and right to accommodate different sensing locations (label edge or backprinted, black stripe). The black stripe sensor locates the leading edge of a label by measuring the level of reflectivity instead of a change in opaqueness. Media thickness can range from 0.0023-inch (0.06 mm) to 0.01-inch (0.25 mm).

Supply rolls have cores with a minimum inside diameter of 3 inch (38 mm). The maximum roll diameter should not exceed 12 inches (203 mm).

## Ribbon

**Direct Thermal:** Consider three important factors when selecting direct thermal ribbon:

1. The abrasive qualities of the material that covers the thermal reactive layer of the paper.
2. The ability of that layer to control the chemical reaction that occurs when the image is "burned,"
3. The amount of heat required to image the paper.

If the coating layer is too abrasive, the printhead will be "sanded off" at a faster rate than would normally occur. If the layer cannot contain the reaction, the printhead will become "pitted," and the dots across the web of the printhead will fail.

The reaction temperature, the temperature at which the chemical process produces an image, is important because the greater the degree of heat required to image the paper, the greater the amount of time needed for the printhead and paper to cool. This process reduces the maximum print speed that can be obtained with the stock.

The abrasive qualities of the stock are not as critical in thermal transfer applications because the thermal transfer ribbon is in direct contact with the printhead when the ribbon is installed.

**Thermal Transfer:** Consider two important factors when selecting thermal transfer ribbon and label combinations.

1. Image quality is affected by the label top coating and ribbon combinations. The top coating provides a layer to contain the substrate fibers and to provide a base for the ribbon to adhere to. Ribbons are formulated to provide various levels of smudge resistance and print quality. Typically, the more expensive media combinations perform better than the cheap combinations.
2. Ribbon backcoating is highly recommended because it provides protection for the printhead. Many models also provide a desirable anti-static coating.

Diagraph thermal transfer ribbons are selected specifically for use with the Prodigy Plus™ print engine. Use of ribbons other than those supplied by Diagraph Value Added Resellers (VARs) or by Diagraph may result in a poor quality printing of bar codes and their ability to be scanned. This may invalidate the printhead warranty.

Diagraph ribbons feature:

- Ribbons are also available in Black, Red, Blue, Green, Gold, White and Brown. Call your Diagraph Sales Representative for more information on colored ribbons. Ribbons are scratch, and smudge resistant
- 1182 feet long (360 meters), 4.6 microns thick
- 1 inch core (no notch required)
- Ink side in
- 1 foot clear trailer for opaque ribbons; opaque trailer for transparent ribbons
- Backcoating highly recommended
- One ribbon has the capacity to image two full 8 inch diameter rolls of labels wound on 3 inch ID cores.

The width of the thermal transfer ribbon should be within 10% of the label width. Additional sizes other than those listed above are available on a custom order basis.

### **Lists of Approved Media**

For a current list of Diagraph approved standard media for use in Diagraph thermal and thermal transfer printers, please contact your Diagraph Sales Representative at 1-800-521-3047.

## PA/4000 GLOSSARY

**acronym**—Word formed from the first letter or letters of the words in a name, a term, or phrase. Well-known acronyms include scuba (*self-contained under-water breathing apparatus*) and sonar (*sound navigation ranging*).

**alignment**—1) Text alignment defines how text is aligned within the left and the right indent paragraph: either flush left, flush right, centered, or justified; 2) Graphic alignment defines how objects align along their sides, centers, tops or bottoms.

**alphanumeric**—Contraction of the words *alphabetic* and *numeric*. A set of alphanumeric characters usually containing letters, numbers, punctuation marks and symbols.

**ANSI**—Abbreviation for the American National Standards Institute, the US government organization responsible for the development and promulgation of data processing standards. It is USA's member body to the International Standards Organization.

**ASCII**—(ASK-key) Acronym for American Standard Code for Information Interchange: the character set and code described by the American National Standard Code for Information Interchange, a standard for representing characters as binary numbers.

**ASCII text file**—Unformatted files that contain readable ASCII characters. If they contain commands and arguments, they will probably end in a .BAT or .CMD extension. If the files contain data, they will probably end in .TXT or .DAT extensions.

**aspect ratio**—The proportional measurement of image size in terms of horizontal length versus vertical height. For example, an image with an aspect ratio of 4:3 has a horizontal length that is 4/3 the vertical height.

**AUTOEXEC.BAT**—File that is executed by the computer as soon as the boot process is completed. This type of file is used in building a turnkey application that requires very little input from a user before starting.

**Auto-Retract**—Feature of the PA/4000 that causes the tamp cylinder to return to the home position when it encounters resistance. **background**—In bar codes, the lighter portion of the printed code which includes the *quiet zones*.

**bar**—Darker element of a printed bar code. It can be either wide or narrow.

**bar code**—An array of parallel rectangular bars and spaces in a predetermined pattern that represents data elements or characters.

**bar code character**—A group of bars and spaces that represent a number, letter or symbol.

**bar code density**—The number of characters which can be represented in a linear inch. Bar code densities are expressed in characters per inch.

**bar code reader**—Device used to scan bar code symbols.

**bar height**—Dimension of the bar measured perpendicular to the bar width.

**bar width**—Edge-to-edge measurement across a bar in a bar code.

**baseline**—The line on which both capital and lower case letters stand.

**baud**—A unit that measures the speed of data transmission: one baud equals one bit per second.

**bearer bar**—Printed box which frames a bar code.

**binary code**—Code which employs only the characters 0 and 1 to represent values.

**buffer**—Storage area to temporarily hold data being transmitted between a peripheral device and a computer that allows for the differences in their respective working speeds.

**byte**—1) Fixed number of bits, often corresponding to a single character and operated on as a single unit; 2) Collection of eight bits capable of representing an *alphanumeric* or special character.

**character**—1) In bar codes, a single group of bars and spaces which represents an individual number, letter or other symbol; 2) In computers, it is any symbol that can be stored and processed by a computer; 3) Letter, digit or other special symbol used as part of the organization, control or representation of data.

**character pitch**—Number of characters printed per horizontal inch of space. Twelve pitch (elite) prints twelve characters per inch; ten pitch (pica) prints ten characters per inch.

**character string**—A group of characters, such as "JOHN SMITH" or "DIAGRAPH."

**check digit**—Character used in a bar code to provide additional data security and checks errors; derived with an *algorithm* employing the other digits in the code.

**check valve**—Valve that allows liquid to flow in one direction only.

**checksum**—Entry at the end of a block of data corresponding to the binary sum of all information in the block. Used in error-checking procedures.

**Code 2 of 5**—Bar code used in the late sixties for warehouse storage systems and sequentially numbered airline tickets. The code is read through the width of the bars and the spaces between the bars.

**Code 39**—Bar code; a discrete, self-checking, variable length symbology that can readily be printed by a variety of technologies. Its bars can be read in either direction and is sometimes referred to as "3 of 9 Code".

**Code 39 MOD 43**—Bar code required by the Health Care Industry, alphanumeric, variable-length, self-checking and includes a Modulus 43 check character for greater data integrity.

**COM**—Abbreviation for a serial communications port on a computer. Usually expressed as "COM port" or associated with a number, "COM 1" or "COM 2."

**configuration**—Selection of compatible hardware devices and software programs to focus the application technology on specific tasks.

**controller**—Device or program that operates automatically to regulate a controlled variable.

**cpi**—characters per inch

**CPU**—Abbreviation for the Central Processing Unit that controls the operation of the entire computer system and executes its arithmetical and logical functions. In a microcomputer, the CPU is a single chip.

**data**—Plural of the word datum, "a single fact." Data then are facts and figures.

**disk**—Memory storage device on which information is stored on one or both sides of a magnetically sensitive rotating disk. Information is retrieved by heads mounted on moving or fixed arms.

**download** -Transmission of data from a central computer to a smaller computer or a computer at a remote site. To upload is the exact opposite.

**downtime**—Periods of time when a computer or manufacturing system is not available to perform work.

**dpi**—dots per inch.

**element**—Single bar or space in a bar code. A combination of elements makes up a character.

**executable file**—Computer files of machine readable instructions that cannot be accessed or edited using a normal *editor*. They typically have a extension of .EXE.

**ETX**—ASCII control code for the end of text. A signal that specifies the end of a text string.

**field**—Pre-determined section of a record that contains a specific portion of information.

**file**—Computer term for a named set of data items stored in machine-readable form.

**firmware**—Computer programs, instructions or functions implemented in user-modifiable hardware. Programs and instructions stored permanently in programmable, read-only memories, constitute a fundamental part of the system hardware.

**flush left**—Text with an even left margin and an uneven, ragged right margin.

**flush right**—Text with an even right margin and an uneven, ragged left margin.

**font**—A complete set of characters—alphabetic, numeric, and punctuation—in one typeface. The font of this glossary is Times.

**friction bearers**—Tire(s) on the edge of encoder cylinders.

**full duplex**—Transmission of data in two directions simultaneously.

**half duplex**—Transmission of data in only one direction at a time.

**handshaking**—The exchange of signals between computers that acknowledges compatible protocol for data exchange.

**header**—Text or graphics that appear on the top of a page, such as the chapter or section title.

**Hertz (HZ)**—A unit of measurement for frequency or *bandwidth*. 1HZ=1 cycle/second

**HMIS**—Hazardous Material Information Sheet

**host computer**—Primary computer in a multi-computer network. The unit issues commands, has access to the most important data and is the most versatile processing element in the system.

**human readable text**—The text in a spoken language associated with a bar code.

**Hz** ( see Hertz)

**I 2 of 5**—Short form of “Interleaved 2 of 5”. System using five bars and their spaces. Each character is represented by five characters or five spaces and two of the five elements are wide.

**Interleaved 2 OF 5**—Numeric only bar code with an even number of characters.

**Interleaved 2 OF 5 MOD 10 (SCS)** —Bar code that conforms to the UPC Council Shipping Container Standard for labeling corrugated shipping containers. It is numeric only, with an even number of characters and employs a Mod 10 check digit for greater data integrity.

**justified**—Text that has even left and right margins. See also *Flush left* and *Flush right*.

**K**—Abbreviation for the Greek prefix kilo-, meaning thousand. In computer terms, K usually represents  $2^{10}$  or 1024.

**Kbyte (Kb)**—1024 bytes.

**LCD**—Liquid crystal display

**liner**—material employed as backing or carrier medium for labels.

**margin** (see Quiet Zone)

**MEK**—Methyl ethyl ketone: base or vehicle for ink

**memory**—Hardware in microcomputers used to store and recall data.

**microcomputer**—Computer based on a microprocessor, used primarily by only one person at a time. Microcomputers work with data words of 4, 8, 16 or 32 bits.

**MSDS**—Material Safety Data Sheet

**noise**—Undesirable electrical interference that degrades a signal. Sources of noise include computer displays, AC power lines and digital switching circuits.

**OCR**—Optical Character Recognition, the machine recognition of printed characters by light-sensing techniques; 2) Acronym for Optical Character Reader. An information processing device that accepts prepared forms and converts data from them to computer output.

**OCR-A**—Abbreviation for the character set contained in the ANSI Standard X3.17-1981: a stylized font used for optical character recognition printing.

**OCR-B**—Abbreviation for the character set contained in the ANSI Standard X3.49-1975: a stylized font used for optical character recognition printing.

**opacity**—1) Optical property of a substrate material that quantifies transmission from the back side or the next sheet; 2) Property of an ink that prevents the substrate from showing through.

**operating system**—Structured set of system programs that controls the activities of a computer system and associated peripheral devices as well as the execution of programs and the flow of data.

**OSHA**—Occupational Safety and Health Administration

**parity**—An error-checking procedure in which the number of 1's must always be the same—either odd or even—for each group of bits transmitted without error.

**PCS**—Print Contrast Signal, measure of the ratios of the reflectiveness between the bars of a bar code.

**PCX**—File extension for bit-mapped graphics file for PC-Paintbrush and other applications that support the PCX format (300 dpi).

**Peel Blade**—A metal plate inside the PA/4000's print engine that separates the label stock from its non-adhesive leader.

**Photocell**—A light-sensing device that detects a product on a conveyor line and triggers the PA/4000 to print and apply a label.

**Pixel**—The smallest element with controllable color and brightness in a video display or computer graphics.

**pressure differential (DP)**—Increases and decreases in pressure as measured by ink or air pressure gauges.

**program**—Set of instructions for a computer to execute that is written in a programming language or assembly language.

**programming**—Process of writing instructions for a computer to execute.



**quiet zone**—The left and right margin spaces at the beginning and end of a bar code. No dark print is located in these areas.

**ragged type**—Type that is flush to either the left or the right margin but not to both.

**RAM**—Acronym for Random access memory, semiconductor memory that can be read and changed during microcomputer operation. RAM is volatile, so all data is lost when power is down.

**raster**—Line pattern traced by rectilinear scanning in display systems.

**reflectance**—Ratio of the amount of light of a specified wavelength reflected from a test surface to the amount of light reflected from a barium oxide or magnesium oxide standard under similar lighting conditions.

**repeatability**—An instrument's ability to produce the same output repeatedly under identical conditions.

**RJ-11**—A telephone-type connector used to connect the Hand-Held Terminal to the PA/4000

**RJS**—Manufacturer of bar code verifiers.

**ROM**—Acronym for Read Only Memory, semiconductor memory containing fixed data that cannot be changed once programmed in manufacture.

**RS-232**—Serial communication standard employed by personal computers. It defines three types of connection: electrical, functional and mechanical—usually used with 25 or 9-pin D-shaped connectors.

**sensor**—Device that produces an electrical output that corresponds to a physical input.

**serial data transmission**—Most common method of sending data from one data terminal to another. To transmit data serially is to transmit it one bit at a time over a single channel.

**slew rate**—The rate at which unprinted label stock advances when no printing is taking place.

**software**—Set of programs that direct a computer. Common types of software include programming language interpreters and compilers; word processing and page layout programs; electronic spreadsheets; and database management programs.

**SOH ASCII**—control code for Start Of Header: a signal that specifies the beginning of a transmission (Hex. 01).

**space**—The lighter element of a bar code formed by the background between bars.

**STX**—ASCII control code for Start of text: a signal that specifies the beginning of a text string (Hex. 02).

**substrate**—Surface that receives ink or a label.

**symbol**—A combination of characters, including start/stop characters and check characters, as required, which form a complete scannable entity.

**symbol length**—Length of the symbol in a bar code measured from the beginning of the quiet area adjacent to the start character to the end of the quiet area adjacent to the stop character.

**Tamp-Pad**—A rubber pad with holes in it used to provide a backing surface for the label as it is applied.

**thermal printing**—Printing technology that uses rapidly-heated pins to activate a heat-sensitive coating on a face material; the selectively-heated areas darken and form characters and pictures.

**thermal transfer printing**—An imprinting method that uses heat and pressure to melt a wax-based ink onto a label.

**transducer**—Device that converts signal from one physical form to another.

**UCS**—Uniform Container Symbols

**UPC E/UPC Version E0**—The zero suppression version of UPC A. Specified for use in the Retail environment. Numeric only, it employs a fixed-length and a Modulus 10 check character.

**UPC EXT (2)**—UPC/EAN two digit extension, typically used on magazines.

**UPC EXT (5)**—UPC/EAN five digit extension, typically used on books for price information.

**UPC SCC (Interleaved 2 OF 5)**—Symbology used for the UPC Council Shipping Contained Standard for the labeling of corrugated shipping containers. It is numeric only and 14 characters long.

**UPC Shipping**—All numeric version of Code 128 used specifically for the UPC Serial Shipping Container Standard. It generates a special MOD 10 check character that is a part of the specification.

**UPC Version A**—Symbology specified for use in the retail environment. It is numeric only, fixed-length and employs a Modulus 10 check character.

**UPC Version E1**—Symbology used for shelf labeling in the Retail environment. It is numeric only and fixed length.

**VOC**—Volatile Organic Compounds

**volatile memory**—Memory that does not retain its content when power is lost.

**web**—1) a continuous roll of paper, such as newsprint, especially of the kind used in web presses; 2) a continuous surface for printing as contrasted to separate surfaces on multiple cartons; 3) the path that paper or label stock travels through a printer.

**web mode**—Continuous printing.

**web width**—The width of label stock.

**weeping**—Condition of low buildup of ink on the orifice of an ink jet printhead.

# **Service/Technical Manual**

## **Diagraph PA/4000 Label Printer/Applicator**

**5802-929  
Revision A**



Part Number - 5802-929  
Revision A

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## 2.1 THEORY OF OPERATION

Section 2.1.1 describes the general theory of operation for the PA/4000 Label Printer Applicator. Sections 2.1.2 and 2.1.3 go into a detailed explanation of the Mechanical and Electrical components that make up the PA/4000.

### 2.1.1 PA/4000 SYSTEM THEORY OF OPERATION

#### NORMAL OPERATION

To begin normal printing and applying:

- Set up the PA/4000 with the necessary air and power requirements (Refer to Section 2 in the Users Manual)
- Set the Menu Select Items using the Hand-Held Terminal (Refer to Section 4 of the User's Manual)
- Install Performance Series for Windows on your PC (Refer to the Performance Series for Windows Software Manual, Section 12)
- Create a format for your label (Refer to Section 3 in the User's Manual)

#### THE PRINT AND APPLY CYCLE

This section will illustrate the exact sequence of events that must occur in order for the PA/4000 to print and apply a label to a box.

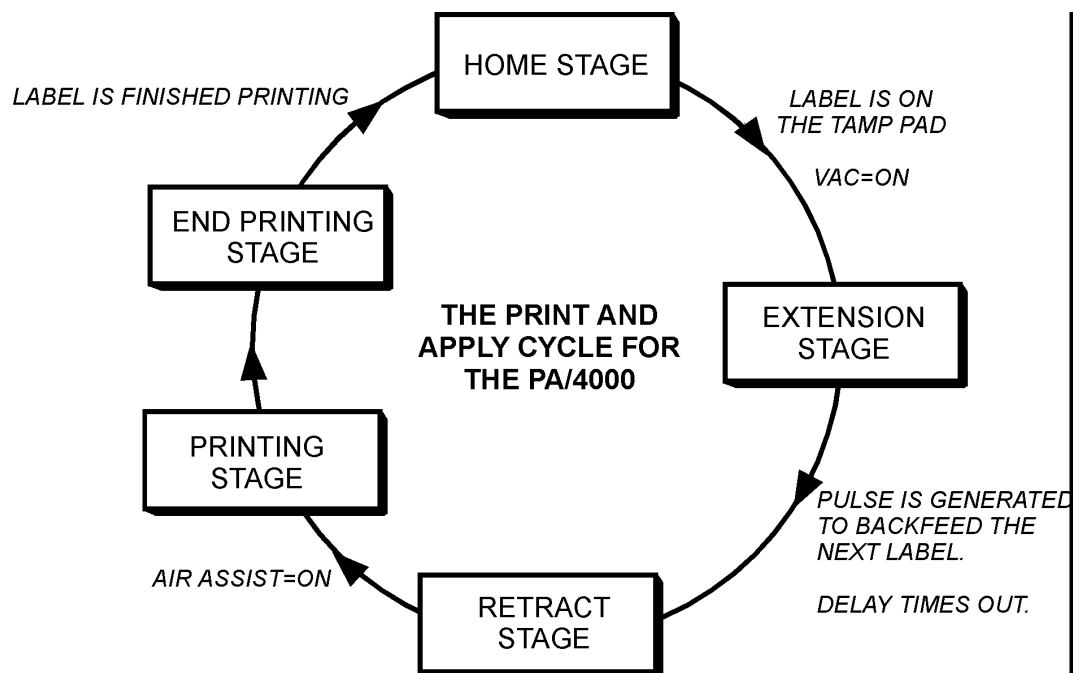


Figure 2-1

## HOME STAGE

During this stage of the Print and Apply Cycle:

- The tamp cylinder is in the home position with a printed label on the tamp pad.
- Vacuum is ON.
- The Product Delay counter begins to count when the passing box trips the photocell.

## EXTENSION STAGE

During this stage of the Print and Apply Cycle:

- The tamp cylinder extends when the Product Delay counter reaches zero.
- The Applicator Board generates a pulse to backfeed the next label.

## RETRACT STAGE

During this stage of the Print and Apply Cycle:

- The tamp cylinder retracts when either: A) the Auto Retract\* circuit issues a signal or B) the Tamp Dwell timer reaches zero. (\*Auto-Retract sensor is only active when Auto Retract is turned ON using the Hand-Held Terminal).
- The PA/4000 applies the printed label to the box.

## PRINTING STAGE

During this stage of the Print and Apply Cycle:

- The tamp cylinder returns to the home position.
- Vacuum turns OFF.
- Air Assist turns ON.
- Printing of the next label begins. (This is true **only** if the backfeed is completed).

## END PRINTING STAGE

During this stage of the Print and Apply Cycle:

- The label has finished printing.
- Vacuum turns on as the label crosses the present sensor.
- When the label has been printed and completely dispensed onto the tamp pad, the Prodigy Plus generates a cutter signal, marking the end of the print cycle.
- The applicator board turns the Air Assist OFF when it receives the cutter signal.
- The PA/4000 is now ready to apply the next label and the cycle continues.

## **2.1.2 PA/4000 MECHANICAL THEORY OF OPERATION**

### **PA/4000 STAND**

The PA/4000 operates in a variety of positions to allow for greater flexibility. The yoke assembly rotates about the stand by loosening the center bolt that fastens the yoke to the stand and re-tightening when in the desired position.

The main unit rotates within the yoke assembly by loosening the 2 end bolts and re-tightening when in the desired position. Thus, labels can be applied on the top of a box or on the side of a box. By adding the Secondary Wipe Down Assembly to the system, labels can be applied to both the side/front or side back of a box. The PA/4000 vertical positioning is flexible as well and can be adjusted with the crank handle on top of the stand.

### **PA/4000 MAIN UNIT**

The main unit, consisting of the Air Control Unit, the Print Engine and Label Supply and Rewind Hubs, is the heart of the PA/4000. Power is supplied to the main unit via factory power at 120 VAC.

Air is supplied to the Air Control Unit from the Air Filter Assembly via factory air. Control of the vacuum air pressure at the tamp pad, air assist air pressure and tamp cylinder air pressure is at the Air Control Unit.

The Print Engine prints the labels and moves them to the tamp pad. Label Supply Hub is where the label roll is placed. After the label is printed and distributed to the tamp pad the carrier is taken up on the Label Rewind Hub.

### **PA/4000 AIR CYLINDER/TAMP ASSEMBLY**

Air travels from a tube at the Air Control Unit to the Air Cylinder and is connected at the top to provide the positive downward travel of the cylinder. Air also travels from the Air Control Unit to the Air Cylinder and is connected at the bottom to provide the negative upward travel of the cylinder. The Tamp Pad Assembly is a set of aluminum plates with a vacuum chamber cut out of the top side of the bottom impact plate.

A gasket lies between the plates and screws hold the assembly together. A foam pad adheres to the bottom of the impact plate to provide a cushion between the plates and the box during impact. This foam pad has vacuum holes that are aligned with those on the impact plate to allow for the suction needed to hold a label on the Tamp Pad Assembly.

The Tamp Pad Assembly is mounted to the Air Cylinder by an adapter plate and screws. After receiving the label from the Print Engine, it is the Air Cylinder/Tamp Pad Assembly that applies the label.

## **PA/4000 AIR FILTER ASSEMBLY**

The air filter assembly connects directly to factory air and filters out impurities and moisture. The assembly mounts to the lower rear part of the stand .

## **PA/4000 HAND-HELD TERMINAL**

The Hand-Held Terminal is used to access the Menu Select Items that control various attributes of the PA/4000. The Hand-Held Terminal connects to the electrical box of the main unit and can be stored on a holster which attaches to the yoke.

## **PA/4000 WARNING TOWER (OPTIONAL)**

The warning tower option is made up of a series of lights and operates as the warning mechanism that indicates to personnel that there is a certain condition that needs attention. The warning tower mounts with a bracket and two bolts to the upper rear portion of the stand.

## **2.1.3 ELECTRONIC SYSTEM THEORY OF OPERATION**

### **PRINTER AND APPLICATOR ELECTRONICS**

The PA/4000 electronics can be broken down into two sections, the Printer section and the Applicator section. The printer section mainly consists of the Prodigy Plus Board and its interface assemblies. The Applicator section consists of the Applicator Board, the Connector Board, the Regulator Assembly and the Hand-Held Terminal.

The following sections explain the function and operation of these boards. They will provide quick assistance to anyone troubleshooting a unit down to the assembly level. (See Engineering Drawings in Section 3 for more information.)

### **APPLICATOR LOGIC BOARD (6105-119)**

The Applicator Logic Board is a microprocessor based board that controls the Applicator function of the PA/4000. It monitors the tamp pad sensors as well as controlling the valves that actuate the cylinder that applies the label to the product. The Applicator Board also communicates to the Hand-Held Terminal and interfaces with the Prodigy Plus Board. It controls the Warning Tower and the Secondary Wipe Down assembly. Finally it monitors the ribbon out and ribbon low assemblies as well as the label low and paper edge sensor assemblies.

The Applicator Board receives power from the Regulator Assembly (6105-384) through the J3 connector. Pin 1, on the J3 connector is Digital Ground (DGND) while pin 2 is 5.0 Vdc. Pin 3 is 24.0 Vdc and pin 4 is Analog Ground (AGND).

**NOTE:**        **Some units may not have the Regulator Board.**



The Applicator Board controls the tamp valve, the air assist valve, and the vacuum valve through the J1 connector. The J1 connector has 24.0 Vdc supplied to pins 1, 3, and 5. The Applicator Board actuates the cylinder by providing a ground path on pin 2. Likewise the Applicator Board actuates the air assist on J1 pin 4 and it controls the vacuum on the tamp pad through J1 pin 6.

The Applicator Board also provides the signals to the Paper Edge Sensor (6105-046) through the J2 connector. There is a potentiometer (R43) that sets the voltage level on J1 pin 1 based on if a label is under the Edge Sensor. With no label under the sensor and only the backing being sensed, the voltage should be 0.25 Vdc +/- 0.05. When a label is under the sensor, the voltage should read greater than 2.0 Vdc.

The Label Low Cable Assembly (6105-047) interfaces to the Applicator Board through the J4 connector. Pins 1 and 3 are connected directly to 5.0 Vdc. Pin 4 supplies the sensor with a current limiting resistor which sets the voltage at 4.3 Vdc +/- 0.5 volts. The return signal from the sensor is brought onto the Applicator board on pin 2. If the Label stock is low, the voltage on this pin will be 0.5 Vdc or less. When the Label stock is not low, the voltage on this pin will be 3.0 Vdc or greater. The potentiometer (R25) sets the voltage level for the Label Low trip point. It is set at 0.6 Vdc +/- 0.05 volts and the voltage can be measured on U13 pin 4.

Depending on the revision level of the PA/4000, the Applicator Board also monitors the Ribbon Low Assembly (6105-362) through the J6 connector. Pins 1 and 3 are connected directly to 5.0 Vdc. Pin 4 supplies the sensor with a current limiting resistor which should read 4.3 Vdc +/- 0.5 volts. The return signal from the sensor is brought onto the Applicator Board on Pin 2. When the ribbon is not low, the voltage on this pin will be less than 0.5 Vdc. When the ribbon is low, the voltage on this pin will be greater than 3.0 Vdc. The potentiometer (R40) sets the voltage level for the Ribbon Low trip point. It is set at 0.5 Vdc +/- 0.05 volts and the voltage can be measured on U13 pin 10.

The Ribbon Out Cable Assembly (6105-045) interfaces to the Applicator Board through the J5 connector. Pins 1 and 3 are connected directly to 5.0 Vdc. Pin 4 supplies the sensor with a current limiting resistor which sets the voltage at 4.3 Vdc +/- 0.5 volts. The return signal from the sensor is brought onto the Applicator board on pin 2. When the ribbon is not out, the voltage on this pin will be less than 0.5 Vdc. When the ribbon is out, the voltage on this pin will be greater than 3.0 Vdc. The potentiometer (R34) sets the voltage level for the Ribbon Out trip point. It is set at 2.0 Vdc +/- 0.05 volts and the voltage can be measured on U13 pin 8.

The Applicator Board receives the Cutter signal on the J7 connector from the Prodigy Plus Board. Pin 1 is connected directly to digital ground. Pin 2 has the Cutter signal on it from the Prodigy Plus Board. Pin 2 voltage is greater than 4.5 Vdc, when there is no cutter signal, and it changes to less than 0.5 Vdc when the cutter signal occurs. Remember that the PA/4000 must have the Cutter Cable (6105-273) attached to the J7 connector and it must have the Cutter option enabled in the Performance Series software for the unit to operate correctly.

The Applicator Board communicates to the Prodigy Plus Board through the J8 connector. The Applicator Board sends the Pause, Feed, Stop, Transfer, Print, Darkness and Ribbon signals to the Prodigy Plus Board through the J8 connector. It receives the Paper Error and Printer Error

signals from the Prodigy Plus Board on pins 2 and 3 of the J8 connector. The Applicator to Prodigy Ribbon Cable Assembly (6105-058) must be connected to the J8 connector for the PA/4000 to operate correctly.

The Applicator Board communicates to the Connector Board (6105-138) and the Hand-Held Terminal (6105-260) through the P1 connector. It receives signals from the Present sensor, the Auto-Retract Sensor, and the Cylinder Home sensor on this connector. The Applicator Board communicates to the Hand-Held Terminal via an RS232 signal scheme on pins 1, 9 and 10 of this connector. The Warning Tower signals and the Secondary Wipe Down signals also come onto the Applicator Board through the P1 connector. Finally, the Photo Cell input signals from Photo Cell 1 and Photo Cell 2 also come onto the Applicator Board through the P1 connector.

### **CONNECTOR BOARD (6105-138)**

The Connector Board provides the cable connections for the PA/4000's external hardware. The external hardware consists of the following items:

- Warning Tower Assembly (6105-271)\* optional
- Tamp Cable Assembly (6105-250) or Tamp Cable Assembly Long (6105-353)
- Secondary Wipe Down Cable Assembly (6105-105) \*for PA/4020 only
- Photo Cell 1 (5700-216)
- Photo Cell 2 (5700-216) \*Optional
- Hand-Held Terminal (6105-260)

There are five DB9 style connectors, J2 through J6, as well as one RJ11 connector that provide the interconnections for the external hardware. There is also a 20 Pin connector, P1, on the back of the board which provides the interconnect path to the Applicator Board (6105-119).

The Connector Board interfaces to the Hand-Held Terminal through the J1, RJ11 style, connector. Pin 1, of the J1 connector, is connected directly to 5.0 Vdc. Pins 2 and 3 are the transmit and receive pins for the RS232 style communication protocol to the Hand-Held Terminal. Finally pin 4 is connected directly to digital ground (DGND).

The J2 connector is a DB9 female style connector. It provides a connection path for the Photo Cell 1 (5700-216) cable assembly. Pin 6 is connected directly to 24.0 Vdc and pin 3 is connected directly to Analog ground (AGND). Pin 8 is the return signal from the Photo Cell and it is an Open Collector output. When there is no box being sensed by the Photo Cell, the voltage will be 5.0 Vdc on pin 8. When a box is sensed by the Photo Cell, the voltage will be less than 0.5 Vdc on pin 8.

The J3 connector is also a DB9 female style connector. It provides a connection path for the Photo Cell 2 (5700-216) cable assembly. This photo cell is optional and is used only when PA/4020 units are configured for Secondary Wipe Down applications. Pin 6 is connected directly to 24.0 Vdc and pin 3 is connected directly to analog ground (AGND). Pin 8 is the return signal from the Photo Cell and it is an Open Collector output. When there is no box being sensed by the Photo Cell, the voltage will be 5.0 Vdc on pin 8. When a box is sensed by the Photo Cell, the voltage will be less than 0.5 Vdc on pin 8.

The J4 connector is also a DB9 female style connector. The Warning Tower Assembly (6105-271) is connected to the J4 connector. Pin 6 is connected directly to Analog ground (AGND). Pin 7 of the J4 connector is the output signal for the Green beacon in the Warning Tower Assembly. When the light is on, the voltage on pin 7 is at 24.0 Vdc. When the light is off, the voltage on pin 7 will be less than 0.5 Vdc. Pin 5 of the J4 connector is the output signal for the Yellow beacon in the Warning Tower Assembly. When the light is on, the voltage on pin 5 is at 24 Vdc. When the light is off, the voltage on pin 5 will be less than 0.5 Vdc. Pin 4 of the J4 connector is the output signal for the Red beacon in the Warning Tower Assembly. When the light is on, the voltage on pin 4 is at 24 Vdc. When the light is off, the voltage on pin 4 will be less than 0.5 Vdc.

The J5 connector is a DB9 female style connector. The Tamp Cable Assembly (6105-250) or the Tamp Cable Assembly Long (6105-353) is connected to the J5 connector. Pin 9 is connected directly to 5.0 Vdc and pin 7 is connected directly to digital ground (DGND). Pin 1 is the return signal from the Auto-Retract sensor on the tamp pad. The voltage on pin 1 will be greater than 4.5 Vdc when no box is being sensed. The voltage on pin 1 will be less than 0.5 Vdc when a box is being sensed by the Auto-Retract sensor. Pin 2 supplies the Auto-Retract sensor with a current limiting resistor which sets the voltage at 4.3 Vdc +/- 0.5 volts.

Pin 3 is the return signal for the cylinder home sensor. When the cylinder is in fully retracted, the voltage at this pin will be greater than 4.0 Vdc. When the cylinder is extended, the voltage at this pin will be less than 0.5 Vdc. Pin 4 is the return signal from the Present sensor on the tamp pad. When a label is detected by the sensor, the voltage at the pin will be greater than 4.0 Vdc. When there is no label on the pad, the voltage on this pin will be less than 0.5 Vdc. Pin 5 supplies the Present sensor with a current limiting resistor which sets the voltage at 4.3 Vdc +/- 0.5 volts.

The J6 connector is a DB9 male style connector. It provides a connection path for the Secondary Wipe Down Cable Assembly (6105-105). Pin 6 is connected directly to 24 Vdc, while pin 3 is connected to analog ground. Pin 8 provides the output signal to the Secondary Wipe Down unit, (If the Secondary Wipe Down cable is connected to the control box). The voltage on pin 8 will be 7.5 Vdc +/- 0.5 volts when the Secondary Wipe Down unit is not activated. Later revisions that drive the air solenoid directly will have pin 8 at 24 Vdc when the Secondary Wipe-Down unit is not activated. The voltage will then become 0.5 Vdc or less when the Secondary Wipe Down unit is activated.

Finally, the P1 connector is a 20 pin ribbon style connector. It provides a connection path to the Applicator Board (6105-119). All the signals from the external hardware is brought onto this connector so that the Applicator Board can have access to these signals. The 20 pin ribbon cable (6105-263) must be connected to the P1 connector for the PA/4000 to operate correctly.

## **REGULATOR ASSEMBLY (6105-384)**

To broaden the range of sensors that can be used, future revisions of the PA/4000 will have a Regulator board that takes the 33 Vdc +/- 3 volts from the Prodigy Plus board and regulates it to 24 Vdc +/- 0.5 volts. The Regulator Assembly (6105-384) is connected between the Prodigy

Plus board and the Applicator Board. The assembly contains a linear regulator, mounted to a heat sink, that provides the Applicator Board with 24 Vdc.

The J1 connector, on the Regulator Assembly, is connected to the J10 connector on the Prodigy Plus board through the Power cable (6105-272). Pin 1, on the J1 connector, is connected to digital ground (DGND). Pin 2 is connected directly to 5.0 Vdc. Pin 3 receives the 33 Vdc +/- 3 volts from the Prodigy Plus board and pin 4 is connected directly to analog ground (AGND).

The J2 connector provides the regulated output voltage of 24 Vdc to the Applicator Board. Pin 1, on the J2 connector, is digital ground (DGND). Pin 2 is connected directly to 5.0 Vdc. Pin 3 provides the regulated 24 Vdc to the Applicator Board and pin 4 is connected to analog ground (AGND). Pins 5 and 6 are not used. The Regulator Power cable (6105-405) connects to the J2 connector on the Regulator Assembly and it also connects to the J3 connector on the Applicator Board.

### **HAND-HELD TERMINAL (6105-260)**

The Hand-Held Terminal (6105-260) is used to setup the programmable options on the PA/4000. It connects to the Connector Board through the Hand-Held Terminal cable (6105-144). The Applicator Board communicates to the Hand-Held Terminal via an RS232 type protocol scheme. The Hand-Held Terminal cable connects to the Hand-Held Terminal at the J3 connector.

The J3 connector, on the Hand-Held Terminal, provides the signals to the Applicator Board via the Connector Board. Pin 1, of the J3 connector, is connected directly to 5.0 Vdc. Pin 4 is connected directly to digital ground (DGND). Pin 2 provides the Hand-Held Terminal with the receive data signal from the Applicator Board. Pin 3 is the transmit data output signal from the Hand-Held Terminal to the Applicator Board.

For more information about the programmable options of the Hand-Held Terminal, reference section 4.0 of the User's Manual contained in Section 1 of this manual.

### **PRODIGY PLUS BOARD (2801-027)**

The PA/4000's control board contains the power supplies, CPU, memory, serial I/O, motor I/O logic, and logic for supplying data to the printhead. The board is intensively controlled by software and, except for correcting the obvious, it is most likely more economical to replace than to repair the PA/4000's control board.

Since some components are easily identifiable and have straightforward uses, let's cover them quickly. One nice design feature of the Prodigy Plus is that the chips are nearly all socketed. Without knowing much about electronics, a service technician can easily make quick repairs if needed or simple replacement of the entire board, which is often more economical.

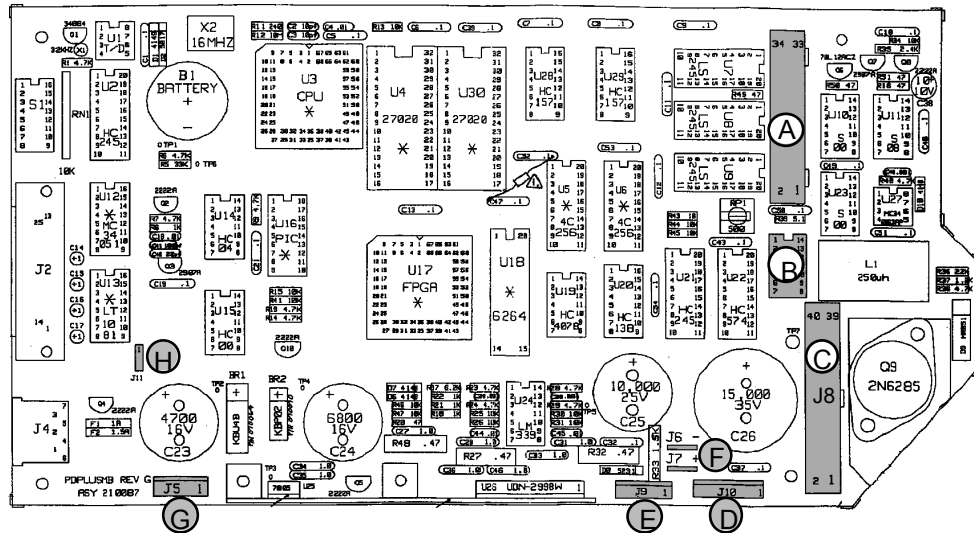


Figure 2-2

Starting clockwise:

**U13 and U12** are the RS-232C and RS-422 line drivers. In the event that these chips may be damaged by high voltage spikes or misuse, either chip may be replaced to return the PA/4000 to normal communications with the host device. The outputs of these two chips connect to other circuitry in a way that the desired interface is enabled by the connection of wires to the pins on J2.

**U2**, the 74HC245 in the upper left hand corner, buffers the settings of SW1 on the back of the PA/4000 from the control board data buss. If the self test patterns (see the Prodigy Plus Operator's Manual) indicate that the switches do not change when you have physically flipped the switches, replace this chip first. Replace the switch bank later if necessary.

**U3** is the microprocessor. If the board has voltage, and nothing seems to run, you may try replacing U3.

**U4 through U6 and U30** are the ROM and RAM that are checked during power up and by the self test (see the Prodigy Plus Operator's Manual). If you encounter a printed error statement, replace the indicated chip.

**U21 and U22** are the buffer chips between the control board and the applicator board. If the PA/4000 was subjected to very high voltage discharges, these I/O chip could be affected. All the TTL level data is buffered by these chips.

**U15 through U18, U23, and U27** are the IC's that most directly affect the shifting and burning of dots to and at the printhead. These components are not likely to be damaged but replacing the complete set of six is most likely more efficient than trying to hit them one at a time.

**U7 through U11, and U23** are the IC's that control the operation of all the memory modules. U6 supply is the voltage used to program the flash module. U7 & U8 buffers the addressing of the modules. U9 buffers the data bytes. The other IC's primarily control what modules are selected or what function is being done.

#### **J4 - Cutter Signal Output**

The remaining connector on the control board is J4. It has voltage and one control line available that provides a signal for a media cutter. Q4 is the buffer devices that are connected to Pin 2 of J4. If problems develop with the cutter signal, Q4 is most likely the defective part.

To enable the cutter signal, SW1-8 on the back of the PA/4000 must be in the ON position. A serial command may be sent to the PA/4000 to set the length of time the signal is active during each print cycle. The cutter signal instruction as listed in the Prodigy Plus Operator's Manual, is the "Hnnnn" command. It is a system level command and must be sent preceded by the ASCII STX character, control "B". The "nnnn" after "H" is the amount of time for the signal to be on in 24  $\mu$ sec (microsecond) increments. The system default is 3125 for a 75 msec (millisecond). The cutter signal is a low going pulse on J4 pin 2.

#### **PIN CONNECTIONS FOR J4**

1	LOGIC GROUND
2	CUTTER SIGNAL OUTPUT
C	CASE EARTH GROUND

### **EDGE SENSOR ASSEMBLY**

The Edge Sensor Assembly is mounted to the center plate just below the print head. It includes two small brackets to guide the paper between a pair of LEDs and optical receivers. These inputs pass through the Applicator board J2 connector to 14PIN DIP Connector J8 to the Main PCB J3 the Main PCB board samples and buffers these inputs to control the printing process.

### **PRINthead**

The printhead connects to the control board at J8. Most of the wires from the control board to the printhead carry +24V and ground. The remaining pins control the serial transfer of data from the control board to the printhead. When data is being sent from the control board to the head, a clock pulse can be seen on pin 5 of U17. A latch pulse can be monitored on pin 11 of U16 after so many clock pulses followed by strobe pulses on pin 8 of U15. Pin 11 & 12 supplies 5V to the head's logic circuits.

The head is a thin-film type head with latch and forward type logic to help decrease the delay time needed between each printed dot row.

### **STEPPER MOTOR**

The stepper motor is a 6V DC stepper motor designed to pull media through the PA/4000. If problems occur that you feel are related to the stepper motor, first check for a jam in the PA/4000 on both the media side and the mechanical drive side of the PA/4000 center plate.

The motor is connected to the control board at J9. U26, which is not easily replaced, contains the drive transistors for the stepper motor. In most any case, replacing the entire control board and/or motor if you suspect problems, is the most efficient way to go.

## **LABEL LOW SENSOR**

The Label Low sensor, located behind the label inner guide disc, sends a signal to the applicator logic board when the label stock falls below a certain level. The inner guide disc has a notch that allows the Label Low sensor to reflect off the label stock. When the label stock depletes below the sensor, it can no longer be sensed.

When the Label Low condition occurs, the Label Low sensor sends a signal to the applicator logic board.

The applicator board will:

- light the yellow Warning Tower light.
- light the yellow Label LED to begin flashing.

The display will read "Label Low."

## **RIBBON LOW SENSOR (FUTURE FEATURE)**

The Ribbon Low sensor is an opposing beam sensor located on a bracket mounted on the print engine behind the ribbon supply spindle. One end of the bracket contains an infrared LED. The other end holds a photo-transistor.

When a full ribbon roll is placed on the ribbon supply spindle, the beam is broken. When the ribbon level depletes to a certain level, the LED and photo-transistor re-connect to make the beam. The sensor then sends a signal to the applicator logic board.

The applicator logic board will:

- light the yellow Warning Tower light.
- cause the yellow Ribbon LED to begin flashing.

The display will read "Ribbon Low."

## **Ribbon Out Sensor**

The Ribbon Out Sensor, located on the print engine above the rear drive roller is commonly used for direct thermal printing.

**NOTE:           Turning OFF the Transfer Menu Select Item using the Hand-Held Terminal, disables the Ribbon Out Sensor.**

When the ribbon runs out, the sensor sends a signal to the applicator board. The applicator board will:

- light the red light on the Warning Tower.
- Causing the yellow Ribbon LED and the red Error LED to flash.

The display will read "Ribbon Out."

## **MEMORY MODULE**

Although the cable and mounting hardware for the MEMORY MODULE, are standard, the MODULES themselves are OPTIONAL. The Prodigy Plus contains two module banks (A and B) that can hold two of four different types of modules (Font, 256K Flash, 256K RAM, and 512K Ram). The use of these modules will depend on the software used with the PA/4000.

### **256K FLASH EPROM MODULE**

This module contains 256K flash EPROMS, which are similar to standard EPROMS except these have the capability to be erased electronically. Although this module may be used in either bank A or B and contain any combination of graphic images, charters fonts, or label formats, it must be placed in the upper bank A for programming. This module also has a write protect switch to prevent users from over writing important data. The module can be programmed when the write protection is off, this means the switch on the module should be moved towards the center of the module. With the flash module you can save data while the PA/4000 is off. It will take more time to program that the ram module. The flash module is rated to be programmed 10,000 times with no failure.

### **512K RAM MODULE**

The 512K ram module contains ram memory which may be written to in either bank A or B. The 512K ram is used in the upper bank (A). 256K will be used for the PA/4000's dot memory buffer and 256K will be used for graphic images, font data, and label formats. When the 512K ram module is used in lower bank B all 512K will be used for graphic images, font data, and label formats.

## **FONT MODULES**

The font modules contain programmed prom memory which may be used in either bank A or B. The modules may not be programmed to or erased, they are programmed one time only. To test a font module to check for corrupt data put the font module into the lower bank B. Then turn the PA/4000 off, now hold in on the FEED button on the front panel and turn the PA/4000 on, the test label should print out the font module checksum and state if the module is good or bad.



## TEST POINT VOLTAGES

TP1	150mV to 200mV	Edge Sensor on Backing
TP1	Greater than 2.0V	Edge Sensor on Label
TP2	9.5 V +/-1.0V	Unregulated Supply Voltage
TP3	5.0V +/- 0.3V	Regulated Supply Voltage
TP4	40.0V +/- 4.0V	Stepper Motor Voltage
TP5	5.1V +/- 0.5V	Motor driver power voltage Right Side <b>Voltage should drop slowly on power down</b>
TP6	-10mv less than	Battery Current * <b>With Power OFF</b> * After the time and date has been set
TP7	20.0V +/- 1.0V	Regulated Print Head Voltage <b>PA/4000 must be printing to check</b>

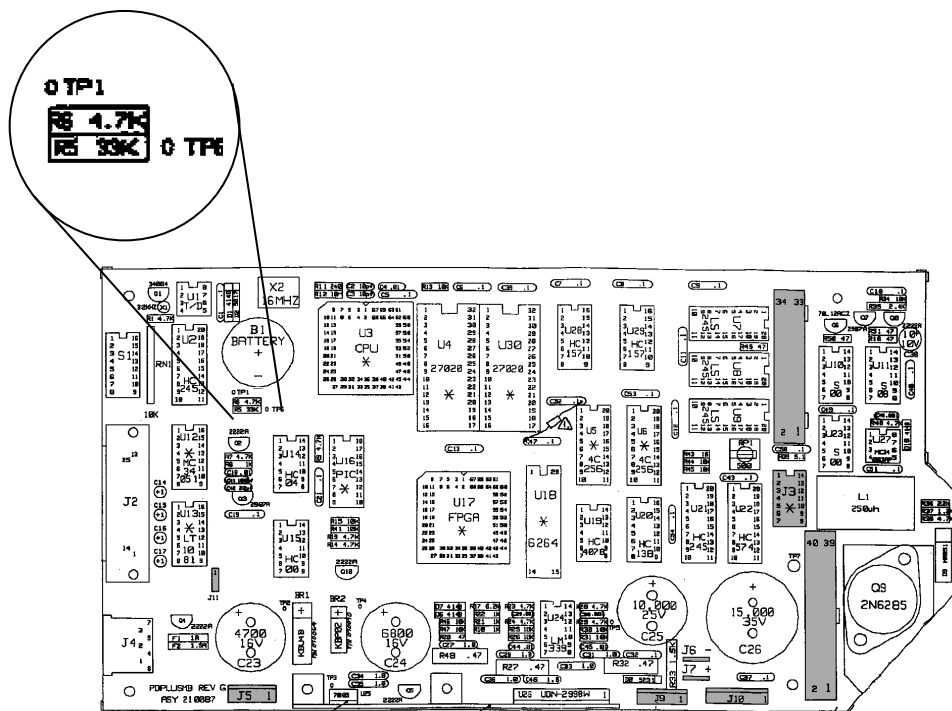


Figure 2-3

## Other Voltage Checks

U1 PIN 8	4.6V +/- 0.3V	Clock Power * <b>With Power ON</b> *
U1 PIN 8	3.6V to 2.5V	Clock Power * <b>With Power OFF</b> *

R27	less than 10mV	Anti noise current Right Side <b>After a label feed</b>
R32	50mV to 90mV	Idle current Left Side <b>After a label feed</b>

**WARNING:** Be very careful to avoid shorting the test probes when checking the following voltage.

Red Wire 33.0V +/- 3.0V Unregulated Head Voltage

**NOTE:** Although some of the checks are looking for current, the voltage drops across the resistors has already been determined.

## Wiring Diagrams

### I/O Cable Configuration

Part Number	Description
2800-875	Prodigy Plus to PC 9 Pin (DB9S) RS-232
2800-026	Prodigy Plus to PC 25 Pin (DB25S) RS-232
	Prodigy Plus to PC Parallel Port (DB25P)

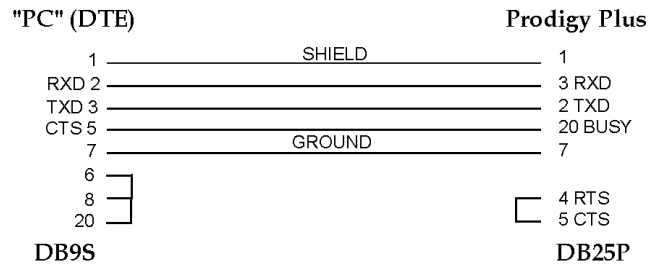
### Pin Connections

All unlisted pins are not connected.

Pin	Description
1	CHASSIS
2	TXD (RS-232)
3	RXD (RS-232)
4	RTS (4.7K ohm to +5Vdc)
5	CTS (input)
7	LOGIC GROUND
20	BUSY (output)
9	TXD +
10	TXD -
18	RXD +
19	RXD -

### Null Modem Cable

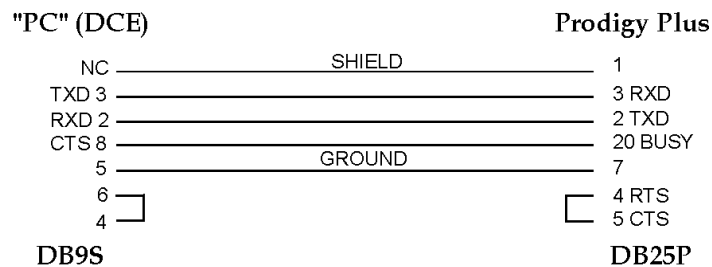
### "PC" (DB9P) to Prodigy Plus



**NOTE:** Cable is used for typical connection to other DCE equipment with XON/XOFF flow control.

### STRAIGHT CABLE (MM)

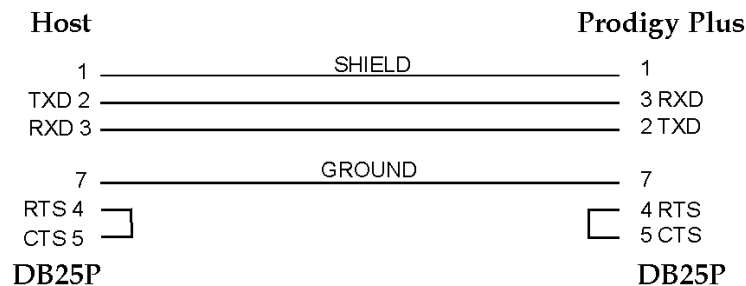
### "PC" (DB9P) to Prodigy Plus



**NOTE:** Cable is used for typical connection to other DCE equipment with XON/XOFF flow control.

### PC (DB25P) TO PRODIGY PLUS

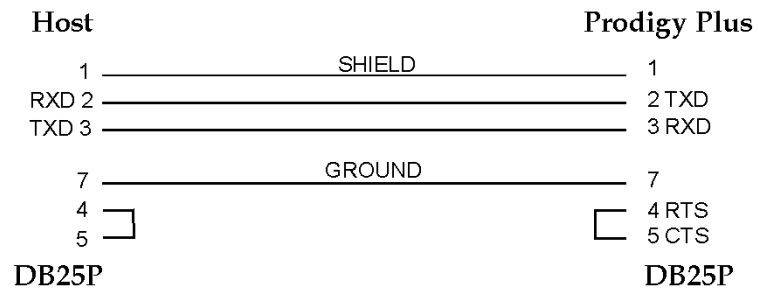
### Straight Cable (MXM)



**NOTE:** Cable is used for connection to iPCi compatible with DB25P communication Ports. Flow control is either XON/XOFF or CTS/DTR.

PC (DB9P) TO PRODIGY PLUS

### Straight Cable (MM)



**NOTE:** Cable is used for connection to iPCi compatible with DB25P communication Ports. Flow control is either XON/XOFF or CTS/DTR.

## 2.2 ADVANCED TROUBLESHOOTING

SYMPTOM	CAUSE	SOLUTION
Unit will not power-up.	No power	<ul style="list-style-type: none"> <li>• Check to see if the Power Switch is ON.</li> <li>• Be sure unit is plugged into a 120 or 230 VAC outlet.</li> <li>• Check the fuse.</li> <li>• Check for a bad electrical outlet.</li> <li>• Check to see that the transformer secondary outputs are properly connected.</li> </ul>
<p>Tamp not operating.</p> <p>Tamp cylinder extends into the box path.</p> <p>Air assist not making any noise.</p> <p>Vacuum not working.</p>	No air	<ul style="list-style-type: none"> <li>• Factory air supply may not be connected to the PA/4000. Connect incoming air supply to the air filter (see Section 2 for more information).</li> <li>• Make sure the OSHA air shut-off valve is in the ON position.</li> <li>• Check air line for blockage and make sure the line is not obstructed.</li> <li>• Tamp, vacuum and air assist controls may not be set. Set the tamp regulator to 20-40 psi and the air assist to 20-60 psi.</li> <li>• Make sure the air regulators are ON.</li> <li>• Make sure the air line is not obstructed.</li> </ul>
Air assist will not shut-off when there is a label on the tamp pad.	<p>Settings</p> <p>Sensor does not see label</p> <p>Loose connection (s)</p> <p>Bad board</p>	<ul style="list-style-type: none"> <li>• Be sure DIP switch number 6 is ON.</li> <li>• Make sure the CUTTER option is selected in the Performance Series software.</li> <li>• Make sure label is under the label present sensor. If not, remove and re-web labels.</li> <li>• Make sure cutter cable is connected.</li> <li>• Check the LED on the air assist valve to see if it is ON. Illuminated indicates an applicator board problem. No light indicates the valve is leaking.</li> </ul>

SYMPTOM	CAUSE	SOLUTION
Tamp head will not tamp.	<p>Settings</p> <p>Cylinder Damaged</p> <p>Loose Connection (s)</p>	<ul style="list-style-type: none"> <li>• Tamp pressure set too low. Turn tamp air regulator clockwise until the gauge reads 20-40 psi.</li> <li>• Dwell value not set high enough. Increase the dwell value with the hand-held terminal (see Section 4 for more information).</li> <li>• Make sure the PA/4000 is not in PAUSE mode.</li> <li>• Bent cylinder rod. Call Diagraph Service Line at 1-800-526-2531.</li> <li>• Cylinder has not returned to HOME position. Push the cylinder all the way up with your hand until the red LED lights.</li> <li>• Make sure the photocell cable is connected to the PA/4000 (see Section 2 for more information).</li> <li>• Cylinder HOME switch is not actuated.</li> <li>• No air.</li> <li>• Too much ambient light in the room.</li> </ul>
Tamp head is hitting the box too hard or too soft.	Auto-Retract is not working properly/DWELL value is set too high	<ul style="list-style-type: none"> <li>• Check to be sure the PA/4000 is level, secure and parallel to the product.</li> <li>• Color of product is too dark. Call Diagraph Service Line at 1-800-526-2531.</li> <li>• If label is not straight on the tamp pad, adjust air assist to 20-40 psi.</li> <li>• Too much ambient light in the room.</li> <li>• Relocate the Auto-retract sensor.</li> </ul>

SYMPTOM	CAUSE	SOLUTION
No Print.	Settings	<ul style="list-style-type: none"> <li>• Check to see if the printer is in PAUSE mode. Press the PAUSE/RESUME key on the hand-held terminal.</li> <li>• Printer stopped. Press the PAUSE/RESUME key on the hand-held terminal.</li> <li>• PC has not sent a batch of labels to the PA/4000. Send a batch of labels.</li> </ul>
	Loose Connection (s)	<ul style="list-style-type: none"> <li>• Check RS-232 cable connection.</li> <li>• Make sure the lock printhead lift lever is down.</li> </ul>
	Ribbon or labels not webbed correctly	<ul style="list-style-type: none"> <li>• Remove ribbon or labels and re-web.</li> </ul>
	Present sensor may be obstructed	<ul style="list-style-type: none"> <li>• Clear any labels or leader from the front of the present sensor.</li> </ul>
	Ribbon or label roll may be bad	<ul style="list-style-type: none"> <li>• Change ribbon or label roll.</li> </ul>
Printer advances 12 inches with no print on the labels, then displays "Printer Error"	Printer continues to run after ribbon has run out	<ul style="list-style-type: none"> <li>• Transfer Menu Select Item in the hand-held terminal is set to OFF. Set Transfer to ON using the hand-held terminal (see Section 4 for more information).</li> </ul>
	Edge Sensor	<ul style="list-style-type: none"> <li>• Route the label through the Edge sensor.</li> <li>• Remove any debris stuck in the Edge sensor.</li> </ul>
	Label Format	<ul style="list-style-type: none"> <li>• Select N (reflective sensor) for the label format when using Performance Series software.</li> </ul>

SYMPTOM	CAUSE	SOLUTION
Poor print quality.	<p>Not enough ribbon tension</p> <p>Ribbon or labels not webbed correctly</p> <p>Dirty or bad printhead</p> <p>A piece of label stock may be stuck to the rollers</p> <p>Incompatible label or ribbon stock</p> <p>Darkness setting</p>	<ul style="list-style-type: none"> <li>• Tighten ribbon (see Section 2 for more information).</li> <li>• Re-web ribbon or labels. NOTE: If the ribbon is placed in the PA/4000 backwards, you must clean the printhead before re-webbing the ribbon.</li> <li>• Replace printhead.</li> <li>• Remove any stray label stock.</li> <li>• Be sure you are using the correct label and ribbon stock.</li> <li>• Check the label format and adjust the Darkness setting using Performance Series software and/or the hand-held terminal.</li> </ul>
Intermittent missed label on box.	Line moving too fast for selected print speed	<ul style="list-style-type: none"> <li>• Select new print speed with your labeling software package.</li> </ul>



## 2.3 REMOVAL AND REPLACEMENT

Section 2.3 discusses removal and replacement procedures for all main components of the PA/4000. Section 2.3 is divided into the following sub-sections: Electrical Box Assembly, Air Box Assembly, Main Power Box Assembly and Other. If you need to replace a component that is not covered in any of these sections, refer to the appropriate Engineering Drawing in Section 3 of this manual for more information.

### 2.3.1 ELECTRICAL BOX ASSEMBLY

#### OPENING THE ELECTRICAL BOX ASSEMBLY

*See Engineering Drawing #6105-150 to further illustrate this procedure.*

1. Turn PA/4000's power switch to the OFF position. Shut off the air valve on the filter assembly.
2. Disconnect all air and electrical connections.
3. Rotate the PA/4000 to a comfortable working position.
4. Open the electrical box assembly by loosening, then removing the two support screws (5091-305) using a 5/16 inch Allen wrench.
5. The electrical box will swing open.

#### REPLACING THE PRODIGY PLUS BOARD

*See Engineering Drawing #6105-150 to further illustrate this procedure.*

1. Open the Electrical Box Assembly.
2. Rotate PA/4000 so the tamp applicator is facing you.
3. Remove the four rear panel support screws (5241-103) using a 3/64 Allen wrench.
4. Disconnect all cables from the Prodigy Plus board.
5. Remove the 2 elastic lock nuts (5307-102) using a 5/16 nutdriver and 5/64 Allen wrench.
6. Hold the board gently by the capacitors. Pull slightly right, then remove.



Do not slide the board out until all cables are disconnected.

7. Reverse the previous steps to install the Prodigy Plus board.

## CABLE CONNECTIONS FOR THE PRODIGY PLUS BOARD (2801-027)

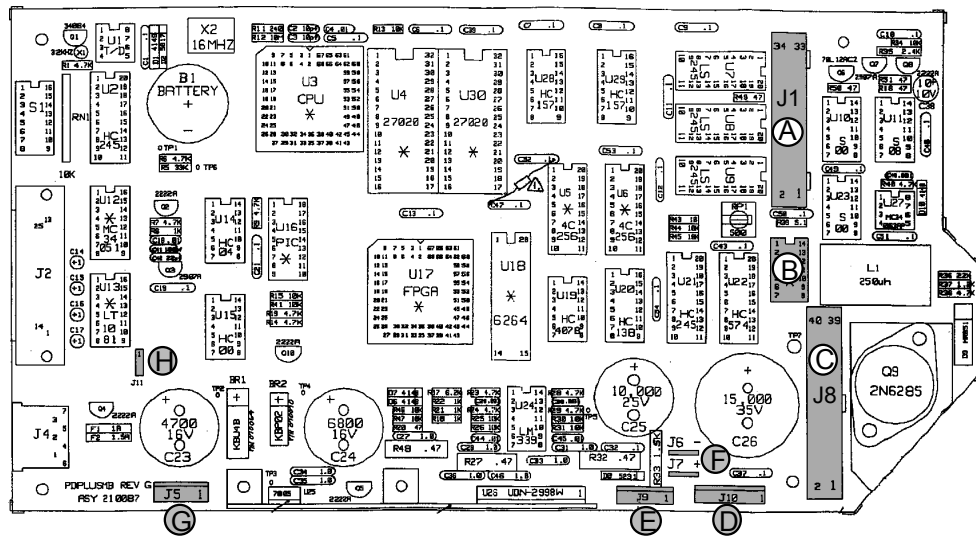


Figure 2-4

- Connect the Memory Module ribbon cable to J1 (A on Figure 2-4)
- Connect the Control Panel ribbon cable to J3 (B on Figure 2-4)
- Connect the Printhead ribbon cable to J8 (C on Figure 2-4)
- Connect the 7 pin Power cable connector to J10, (D on Figure 2-4)
- Connect the 6 pin Stepper Motor cable connector to J9, (E on Figure 2-4)
- Connect the white spade lug (attached to the power cable) to J6 (F on Figure 2-4)
- Connect the red spade lug attached to the power cable) to J7 (F on Figure 2-4)
- Connect the Stepper Motor cable to J5 (G on Figure 2-4)
- Connect the Cutter cable to J11 (H on Figure 2-4)

## REPLACING THE APPLICATOR LOGIC BOARD (6105-119)

See Engineering Drawing #6105-150 to further illustrate this procedure.

1. Open the Electrical Box Assembly.
2. Remove all cables from the Applicator Board. Be sure to mark cables for proper identification during the replacement procedure.
3. Remove the four buttonhead screws (5241-302) located on the top panel of the Electrical Box Assembly using a 5/64 inch Allen wrench.
4. Slide the board out.
5. Reverse the previous steps to replace the Applicator Logic Board.

## REPLACING THE CONNECTOR BOARD (6105-138)

See Engineering Drawing #6105-150 to further illustrate this procedure.

1. Open the Electrical Box Assembly.
2. Remove the Connector Board cable (6105-263).

3. Remove the 10 (4-40) standoffs (5700-417) which hold the Connector Board to the Recessed Panel.
4. Carefully remove the Connector Board from the recessed panel.
5. Reverse the previous steps to replace the Connector Board.

### **2.3.2 AIR SUPPLY ASSEMBLY**

#### **OPENING THE AIR SUPPLY BOX**

*See Engineering Drawing #6105-107 to further illustrate this procedure.*

1. Turn PA/4000's power switch to the OFF position. Shut off the air valve on the filter assembly.
2. Disconnect all air and electrical connections.
3. Rotate the PA/4000 to a comfortable working position.
4. Open the air box assembly by removing the four buttonhead screws ( 5241-705) using a 1/8 inch Allen wrench.
5. Remove the air supply cover.

#### **REPLACING THE AIR PRESSURE REGULATORS (1770-078)**

*See Engineering Drawing #6105-107 to further illustrate this procedure.*

1. Remove the Air Supply Cover (6105-256).
2. Turn the black plastic mounting nut (1901-219) to the left to loosen.
3. Remove all air tubing from the Air Regulator you wish to replace.
4. Carefully remove the air regulator assembly.
5. Reverse the previous steps to replace the Air Regulator.

#### **REPLACING THE 24 VDC VALVES**

*See Engineering Drawing #6105-107 to further illustrate this procedure.*

1. Remove the Air Supply Cover (6105-256).
2. Loosen the two 4-40 lock nuts (#18 on Eng. DWG 6105-107) that hold the 24 VDC valves in place using a 1/4 inch wrench.
3. Slide 24 VDC valve off the thread rod (#5 on Eng. DWG 6105-107).
4. Reverse the previous steps to install the 24 VDC Valves.

#### **REPLACING THE VACUUM FILTER ELEMENT (6105-321)**

*See Engineering Drawing #6105-107 to further illustrate this procedure.*

1. Remove the Air Supply Cover (6105-256).
2. Turn the clear plastic Vacuum Filter Assembly (#29 on Eng. DWG 6105-107) to the left to loosen.

3. Remove the filter inside the housing.
4. Reverse the previous steps to replace the Vacuum Filter Assembly.

## REPLACING THE VACUUM UNIT (6105-256)

*See Engineering Drawing #6105-107 to further illustrate this procedure.*

1. Remove the Air Supply Cover (6105-256).
2. Remove the two screws that hold the Vacuum Pump to the Air Supply Bracket using a flat head screwdriver.
3. Remove the Vacuum Pump.
4. Disconnect the air hoses connected to the Vacuum Pump.
5. Insert the 1/4 inch hose into the top fitting on the new Vacuum Pump.
6. Insert the 1/8 inch hose into the front fitting on the new Vacuum Pump.
7. Secure the new Vacuum Pump to the Air Supply Bracket with two screws.

## 2.3.3 MAIN POWER BOX ASSEMBLY

### PROCEDURE FOR OPENING THE MAIN POWER BOX ASSEMBLY

*See Engineering Drawing 6105-100 to further illustrate this procedure.*

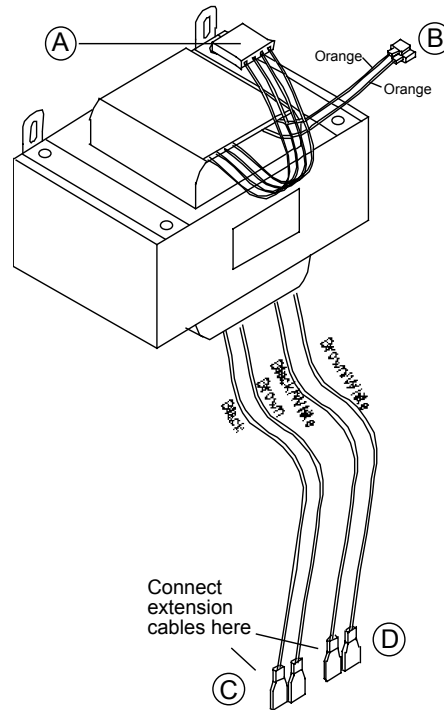
1. Turn PA/4000's power switch to the OFF position. Shut off the air valve on the filter assembly.
2. Disconnect all air and electrical connections.
3. Rotate the PA/4000 to a comfortable working position.
4. Remove the four buttonhead screws (#38 on ENG. DWG 6105-100) using a 5/16 inch Allen wrench.
5. Remove the rear panel (6105-284) of the Main Power Box.

## REPLACING THE TRANSFORMER

*See Engineering Drawing #6105-100 to further illustrate this procedure.*

1. Open the Main Power Box Assembly.
2. Disconnect the MATE-N-LOCK transformer connector by pulling it apart.
3. Disconnect the two orange lead wires from the rectifier bridge. DO NOT disconnect the red or black wires from the rectifier bridge.
4. Remove the four transformer support bolts using a Phillips screwdriver.
5. Disconnect the black wire from the fuse holder.
6. Disconnect the transformer's white wire from the transformer from the power input module.
7. Cut all wire tie wraps from transformer leads. DO NOT cut any wires.
8. Remove the transformer.
9. Mount the mounting plate inside the PA/4000 using the four transformer support screws.
10. Place a flat washer on each of the four studs protruding from the mounting plate.
11. Slide the new transformer onto the mounting plate making sure that the black and brown wires face down. (See Figure 2-5)

12. Place another flat washer on each of the four studs protruding from the mounting plate.
13. Place a lock washer over the flat washer on each of the four studs.
14. Place a nut on each of the four studs protruding from the mounting plate and tighten with a 11/32 inch nutdriver.



**Figure 2-5**

15. Connect the plain black and plain brown wires to the cable extension with the smaller spade lug (part #6105-398) (C on Figure 2-5).
16. Connect the cable extension assembly from the step 17 to the fuse holder. You may need to compress the spade lug with a pair of pliers.
17. Connect the black/white and the brown/white wires to the cable extension with the larger spade lug (part #6105-399 (D on Figure 2-5).
18. Connect the cable extension assembly from step 19 to the power input module (former connection of the old white transformer lead).
19. Connect the orange lead wires to the rectifier bridge (B on Figure 2-5).
20. Connect the MATE-N-LOCK transformer connector (A on Figure 2-5).
21. Secure all loose wires with the four provided tie wraps.
22. Replace the transformer case cover and secure with the four transformer case screws. Tighten in place.
23. Place the retrofit label on the cover of the transformer case.
24. Reconnect the PA/4000's power cable.
25. Turn the POWER switch to the ON position.
26. Make sure the hand-held display reads ALL OK.

## **REPLACING THE 2.0 AMP FUSE (6105-383)**

*See Engineering Drawing #6105-100 to further illustrate this procedure.*

1. Turn the PA/4000's power switch to the OFF position and unplug AC power cord.
2. Using the flat blade screwdriver, push down on the fuse assembly and turn counter-clockwise. Fuse assembly should become loose and easily accessible.
3. Remove the fuse assembly.
4. Remove fuse and discard.
5. Insert the new 2.0 Amp fuse into the fuse assembly.
6. Place fuse assembly back into the PA/4000 fuse slot.
7. Using the flat head screwdriver, push down on the fuse assembly and turn clockwise to tighten.

## **REPLACING THE BRIDGE RECTIFIER (2801-811)**

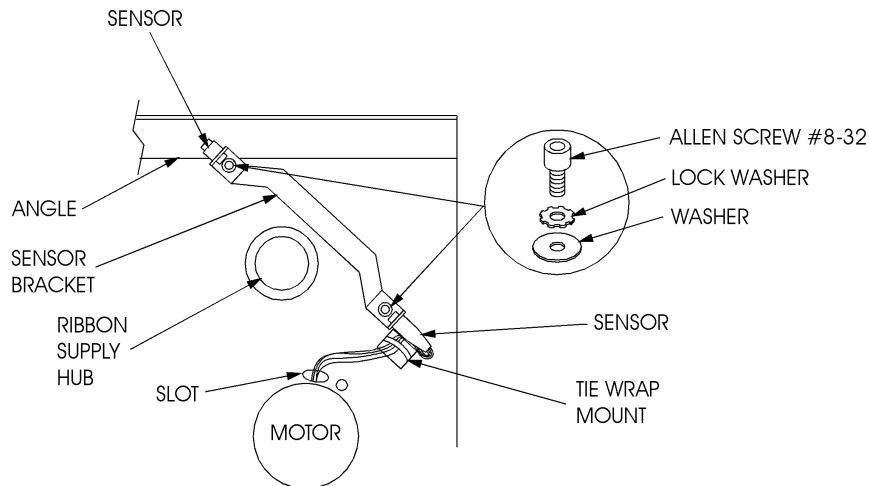
*See Engineering Drawing #6105-100 to further illustrate this procedure.*

1. Turn the PA/4000's power switch to the OFF position.
2. Disconnect all electrical and air connections.
3. Open the Main Power Box Assembly
4. Disconnect all wires from the bridge rectifier.
5. Loosen the screw holding the bridge rectifier to the PA/4000 using a 9/64 inch allen wrench.
6. Connect the red lead to the upper left connector marked "+"
7. Connect the white lead to the lower right connector marked "-"
8. Connect one of the orange leads to the upper right connector marked "AC"
9. Connect the remaining orange lead to the lower left connector also marked "AC"

## **2.3.4 SENSORS**

### **PROCEDURE FOR REPLACING THE RIBBON LOW SENSOR**

1. Turn PA/4000's power switch to the OFF position. Shut off the air valve on the filter assembly.
2. Disconnect all air hoses and electrical cables and remove the ribbon spool from the ribbon supply hub.
3. Rotate the PA/4000 to a comfortable working position.
4. Open the electrical box assembly.
5. Route the ribbon low sensor assembly cable through the slot above the stepper motor. (Fig. 2-6)
6. Align the ribbon low sensor assembly with the holes in the PA/4000 as shown in Figure 2-6.



**Figure 2-6**

7. Place a flat washer and a lock washer on each of the screws provided.
8. Insert the top screw (#8-32 S.H.C.S.) through the ribbon low sensor assembly and tighten.



*Be sure that the Ribbon Low Sensor Assembly lays flat against the surface of the PA/4000. You may need to adjust the angle supporting the hinged plastic cover to accomplish this.*

9. Align the plastic tie wrap mount with the hole in the PA/4000 as shown in Figure 2-6.
10. Secure the plastic tie wrap mount to the PA/4000 using the #6-32 flat head screw.
11. Insert the bottom screw (#8-32 S.H.C.S.) through the ribbon low sensor assembly and tighten.
12. Secure ribbon low sensor cable to the tie wrap mount using tie wraps.
13. Route loose end of the ribbon low sensor cable through the electrical box assembly and connect it to J6 on the applicator logic board.
14. Secure loose ribbon low sensor cable with tie wraps. Give yourself enough slack in the cable to allow for the stress caused by closing the electrical box.
15. Close the electrical box. Be sure that the cutter cable stays in place.
16. Replace the two screws which hold the electrical box in place.
17. Return the PA/4000 to its original position.
18. Place new ribbon supply on supply spindle.
19. Re-connect all air hoses and electrical cables, open air valve and turn the power switch to the ON position.
20. Place installation label, (Ribbon Low Kit Installed) next to serial number label after the system has been tested.



## **REPLACING THE TAMP SENSORS: AUTO-RETRACT, LABEL PRESENT, AMBIENT LIGHT and CYLINDER HOME**

*See Engineering Drawing #6105-150 to further illustrate this procedure.*

NOTE: All four sensors are connected to cable assembly #6105-250. If any one of these sensors fails, replace the entire cable assembly.

1. Turn the PA/4000's power switch to the OFF position.
2. Turn the Air Shut-Off Valve to the OFF position.
3. Locate the three sensors on the Tamp Pad/Cylinder Assembly.
4. Remove the single screw holding each sensor to the Tamp Pad.
5. Cut the tie wrap holding the sensor cable to the pad.
6. Cut the tie wrap holding the sensor cable to the top of the air cylinder.
7. Remove the cable from J5 on the rear panel of the PA/4000. Set aside.
8. Find the sensor marked "P" (Present) and place it over the correct hole, facing the print engine.
9. Adjust the sensor to the all the way up position.
10. Replace the screw and tighten to secure the sensor.
11. Find the sensor marked "R" (Retract) and place it over the correct hole on the side of the Tamp Pad. Be sure that the sensor will not come into contact with the product when the Tamp Pad extends.
12. Find the sensor marked "A" (Ambient Light) and place it over the correct hold located on the other side of the Tamp Pad.
13. Bundle all three wires together and fold the bottom part of the coil cable onto the adhesive backed tie mount. Secure with a tie wrap.
14. Plug the connector cable into J5 on the rear panel of the PA/4000.
15. Turn power on - DO NOT TURN AIR ON!
16. Mount the Home Cylinder sensor using a 2/64 inch Allen wrench. DO NOT TIGHTEN.
17. Return the Tamp Cylinder to the home position by pushing up on the tamp pad.
18. Slide the Home Cylinder Bracket assembly up the cylinder until the red LED on the Home Cylinder Sensor lights. Tighten the Home Cylinder Bracket Assembly.
19. Return the system to normal operating mode.

## **REPLACING THE EDGE SENSOR**

1. Turn the PA/4000's power switch to the OFF position.
2. Open the Electrical Box Assembly.
3. Locate and remove the 6 wire cable connected to J2 of the Front Panel PCB.
4. Locate the Phillips head screw that secures the Adjustment Screw Bracket to the PA/4000. Loosen, but do not remove, the screw.
5. Locate and remove the E-clip, retaining washer, and spring washer from the end of the Sensor Shaft.
6. Rotate the Sensor Shaft counter-clockwise until the sensor assembly comes free from the shaft.
7. Now the sensor and shaft can be removed from the PA/4000.
8. Re-assemble the Label Edge Sensor components in reverse order as above.

9. Be sure that the Adjustment Screw Bracket is positioned as far back as possible before re-tightening the screw.
10. Close the Electrical Box.
11. Return the system to normal operating mode.


## REPLACING THE RIBBON OUT SENSOR

1. Turn the PA/4000's power switch to the OFF position.
2. Open Electrical Box Assembly.
3. Locate and remove the 4-wire cable connected to J5 on the Applicator Board.
4. Press in the two tabs on the side that hold the sensor mount in place and push the mount out of the centerplate.
5. Press the Ribbon sensor back into the slot in the centerplate making sure the wires are at the top of the sensor.
6. Re-connect the 4-wire cable to J5 on the Applicator Board.
7. Close the Electrical Box Assembly.

## 2.3.5 OTHER REPLACEABLE COMPONENTS

### REPLACING THE PRINthead (2801-022)

*See Engineering Drawing #6105-101 to further illustrate this procedure.*

1. Turn the PA/4000's power switch to the OFF position. Shut air OFF.
  2. Move the unit away from the production line and remove the power cord.
  3. Remove existing label stock and ribbon completely from the PA4000.
  4. Locate the printhead, printhead cable, media sensor, and the notch in the support bracket below the printhead.
  5. Where the plate is notched, slide the metal jig up into the strain relief portion of printhead cable.
  6. Carefully push the jig towards the label rewind to unplug the connector.
  7. Loosen the screw that holds the printhead onto the printhead mount. This is a captive screw so it will not come completely out.
  8. Lift the printhead using the printhead lever and remove the printhead.
-  9. When installing the new print head, be sure not to touch the glass film area with your fingers. Also, be sure not to scratch this surface while installing the unit.
10. Be sure to align the new printhead with the alignment pins. Once the new printhead is in place, lower the lever just enough to hold it in place. Try to tighten the captive screw. Remove the screw if it does not tighten properly. Check the alignment of the head and try again. When the screw starts successfully, tighten two or three turns then lift the head and check to be sure the head is properly lined up. If everything is aligned properly, then finish tightening the screw.
  11. Close the printhead using the printhead lever.
  12. With the metal jig back in the strain relief of the printhead cable press the connector back into the printhead. Once the printhead cable is fully inserted, remove the jig.
  13. Reload the ribbon and label stock.
  14. Check printhead by printing several labels. Adjust the Darkness Value using the

Hand-Held Terminal to compensate for any differences between printheads.

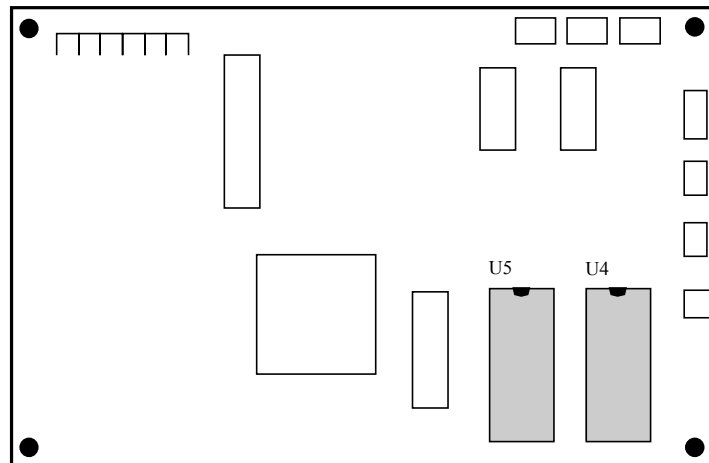
## PROCEDURE FOR REPLACING THE STEPPER MOTOR (6105-050)

*See Engineering Drawing #6105-101 to further illustrate this procedure.*

1. Turn PA/4000's power switch to the OFF position. Shut off the air valve on the filter assembly.
2. Open the plastic Print Engine Cover (6105-040).
3. Open the Electrical Box assembly.
4. Cut the tie wraps holding the stepper motor cable to the other cables inside the Electrical Box.
5. Remove the Stepper Motor connector from J9 on the Prodigy Plus board.
6. Carefully remove the Stepper Motor.
7. Reverse the previous steps to replace the Stepper Motor.

## REPLACING THE FIRMWARE ON THE APPLICATOR BOARD

1. Turn the PA/4000's power switch to the OFF position. Remove the power cord. Disconnect all air hose and electrical connections.
2. Rotate PA/4000 to a comfortable working position.
3. Open the Electrical Box Assembly.
4. Locate the applicator board. (See Figure 2-7)
5. Remove the old EPROM from the U5 socket on the applicator board (See Figure 2-7) using a small, flat blade screwdriver or EPROM remover.



**Figure 2-7**



Pay particular attention to the notch on the end of the old EPROM. This notch tells you that pin one is the first pin to the left of the notch. The U5 socket on the applicator board also has a notch. These two notches must be aligned for a successful firmware installation.

6. Insert the new EPROM into the U5 socket. Press down with your thumb to secure the EPROM.

7. Inspect the EPROM to make sure that none of the pins are bent or out of place.
8. Check all cable connections to be sure that no cables were disconnected during the firmware installation.
9. Replace all electrical and air connections.
10. Turn the PA/4000's power switch to the ON position.



If the display is blank and the yellow label and ribbon LEDs are flashing, the EPROM was not installed correctly. Follow steps 1-9 above until the display reads All O.K. This firmware change will not affect any settings in the Hand-Held Terminal.

## REPLACING THE TAMP CYLINDER ASSEMBLY

1. Turn the PA/4000's power switch to the OFF position.
2. Remove the two support screws using a 5/32 Allen wrench.
3. Slide the Tamp Cylinder Assembly away from the PA/4000 until it detaches from the mounting bar.
4. Slide the replacement Tamp Cylinder Assembly onto the mounting bar and towards the PA/4000 as far as it will go.
5. Slide the replacement Tamp Cylinder 1/4 of an inch away from the PA/4000.
6. Manually extend the replacement Tamp Cylinder to check for obstructions. If any component restricts the movement of the Tamp Cylinder, slide the Tamp Cylinder assembly away from the PA/4000 until the problem is corrected.
7. Tighten the two support screws using a 5/32 Allen wrench.

*NOTE: Don't forget to connect the Sensor cable assembly to J5 on the rear panel of the PA/4000.*

## REPLACING THE TIMING BELT

1. Turn the PA/4000's power switch to the OFF position.
2. Open the Electrical Box.
3. Loosen the set screw and remove the collar on the outside of the Rewind Bearing Plate.
4. Remove the three screws that secure the Rewind Bearing Plate to the PA/4000.
5. Remove the Slip Clutch Spring.
6. Loosen the set screw and remove the Slip Clutch Pulley.
7. Loosen the set screw and remove the Collar on the Ribbon Supply Shaft.
8. Remove the Bearing Mount Bracket by removing the three screws that secure it to the PA/4000.
9. Remove the spring for the Upper Tensioner.
10. Remove the E-clip that secures the Upper Tensioner assembly to the PA/4000.
11. Remove the Timing Belt from the PA/4000.
12. Reverse the previous steps to replace the Timing Belt.



## **REPLACING THE RIBBON TAKE-UP HUB**

1. Turn the PA/4000's power switch to the OFF position.
2. Open the Print Engine Cover.
3. Hold the Collar on the Electronics side of the PA/4000 and rotate the outer part of the Ribbon Take-up Hub until the set screw is accessible through the notch in the hub.
4. Loosen the Set Screw.
5. The Ribbon Take-up Hub will now slide off the shaft.
6. Reverse the previous steps to install the Ribbon Take-up Hub.



## 2.4 ADJUSTMENTS AND MAINTENANCE

Section 2.4 describes adjustment and maintenance procedures for the PA/4000. If you need an adjustment or maintenance procedure for a component not covered in this section, call Diagraph Service at 1-800-526-2531.

### 2.4.1 PRINthead

**WARNING:**        *Turn OFF the PA/4000 and unplug the unit from the outlet before cleaning the Printhead.*

The Printhead can become dirty from normal operation. Clean the printhead (approx. every 2000 inches dependent on media material) for optimum print quality. Use a cotton swab and Isopropyl Alcohol to clean the printhead.

#### Internal/External Cleaning

**WARNING:**        *Turn OFF the PA/4000 and unplug the unit from the outlet before cleaning any part on the PA/4000.*

Clean all rollers, guides and assemblies regularly. Isopropyl Alcohol can be used to clean these areas. Regular cleaning will keep all items free from residue.

Clean the exterior of the PA/4000 using a soft damp (not wet) cloth. A mild detergent may be used to remove heavier stains. Do not use abrasive cleaners.

#### Lubrication

All bearings in the PA/4000 are either permanently lubricated or made of smooth plastic, therefore lubrication is not necessary. The slip clutches in the PA/4000 are pre-lubricated and should not require further lubrication. However, if one of these clutches were to dry out, squeaking or humming could result. If this occurs, lubricate the clutch as follows:

#### Ribbon Supply Clutch

Open the Electrical Box Assembly. Remove the clutch spring and apply a small amount of IBM#23 grease into the groove on the pulley. Replace spring and cover.

#### Ribbon Rewind Clutch

Locate and loosen the set screw on the outside collar. Remove the collar and hub assembly off of axle. Apply 10-12 drops of quality SAE 5 machine oil to the (2) felt

disks. Reassemble and slide the collar back onto axle, making sure when tightening that the set screw locates into the axle detent.

## **Printhead Pressure and Support Adjustment**

The PA/4000's printhead pressure comes from two springs in the head mount assembly which apply a fixed 9.5 pounds of force upon the printhead. If greater or lesser head pressure is desired, contact Diagraph Corporation at 1-800-521-3047.

Adjust printhead support if you are using media widths less than 3.5 inches.

The head support plate supports the outer end of the printhead when printing on narrow labels. Without this support, the printhead would bear down on the drive roller, causing diminished print quality and premature wear. Again, the head support plate needs to be engaged only when the media width is less than 3.5 inches.

To make the adjustment, loosen the two mount screws that fasten the head support plate, leaving the screw on the left slightly snug. Load the labels, then engage the printhead by rotating the head lift lever to the down position. Next, turn the Head Support Adjustment Screw clockwise until the support plate moves down and contacts the bearing plate underneath. Tighten the two mount screws to secure the support plate, and test to make sure the print is not dark on the outside edge.

NOTE: *The mount screws which secure the head support plate also secure the ribbon shield. When loosening these screws, be aware that both the plate and the shield are adjustable. If you move one, the other may move also.*

NOTE: *For narrow stock the head support plate should be adjusted so that the print image on the outside edge of the label begins to lighten. Then gradually lower the head support plate until the print quality becomes acceptable. This should keep the printhead off of the roller. It would be advisable for the print quality on the outer edge to be lighter if possible. This will ensure that the printhead does not come in contact with the roller. When this procedure is done you will have to realign the ribbon shield to compensate for ribbon tracking.*

## **Printhead Alignment**

When using heavier tag stock, the printhead may need to be adjusted forward. The components involved in printhead alignment are illustrated below.

Adjust the horizontal placement of the printhead by turning the right and left head adjust screws which correspond to the right and left side of the printhead. Turning the screws 1/2 turn counterclockwise will move the printhead .012" forward. Conversely, 1/2 turn clockwise will move the printhead back .012".

**CAUTION:**        *Do not turn the head adjust screws more than 2 turns in either direction. Damage to the head mount assembly could result if the adjustment screws are turned too far.*

Print a label and inspect the printing quality. With a 1/16" hex key, turn the left and right head adjust screws counter-clockwise 1/4 to 1/2 turn until the desired print quality is achieved. Finally, turn the left head adjust screw 1/4 turn counter clockwise.

### **Direct Thermal Adjustment**

For best results when using thermal label stock, turn the head adjust screws 1/4 turn clockwise, to move the printhead 6 thousands of an inch back on the roller. When the printhead is aligned with thermal transfer operation in mind the printhead should be forward on the roller so the ribbon will separate from the label while the wax/ink is still warm. With direct thermal operation, the printhead burn line needs to be back further on the roller. This will create a higher pressure on the roller and thus heat will transfer to the label stock more efficiently.

## **2.4.2 RIBBON FEED AND TRACKING ADJUSTMENTS**

1. Turn power switch to the ON position. Use full-width media and ribbon for this adjustment procedure.
2. Install thermal transfer ribbon and media into PA/4000, but do not secure the ribbon to the ribbon rewind hub.
3. Press the FEED button several times to normalize the feeding of the ribbon and media. Check the distance from the center plate to the edge of the label backing, this should be the same distance as it is back where labels come of the roll of stock (about 320 thousands of an inch). If this is within about 30 thousand of an inch, proceed to step 5.
4. Open the Electrical Box Assembly to expose the electronics compartment. Locate the Phillips screws holding the label guide standoff. Loosen, but do not remove the screw. On the label side of the PA/4000 adjust the hex set screw that comes in contact with the center plate. This will raise or lower the extrusion and adjust the flow of the labels which will adjust the tracking of the labels. If the labels are tracking too much toward the centerplate, ribbon wrinkle may occur.
5. Press the FEED button several times to normalize the feeding of the ribbon and media. Observe if there is any "rippling" or "bagging" of the ribbon as it comes from the supply hub and goes under the printhead assembly. If there is rippling or bagging, the supply hub needs to be repositioned. If there is no rippling or bagging observed, go on to Step 10.

6. Locate the bearing mount bracket and loosen the three screws that secure it to the PA/4000. Do not remove the screws.
7. By applying pressure to the bracket, the supply hub can be repositioned so that there is no rippling or bagging in the ribbon as it comes from the supply hub. The ribbon should also be adjusted in this manner so that tension is even across the entire width of the ribbon. Notice that tightening or loosening the set screw, located on the top edge of the bracket, lifts and drops the outside end of the supply hub.
8. Once the bracket is positioned properly, tighten the three screws located in the side of the bracket. Then re-check the positioning of the supply hub and make certain that the ribbon tension is even across the entire width of the ribbon.
9. Feed three or four labels and observe the ribbon as it comes from the supply hub. Again, there should be no wrinkles evident.
10. Next, feed the ribbon and paper out the front of the PA/4000 together and check the ribbon for drifting to one side away from the paper stock. If the ribbon overlaps one edge of the paper stock, the ribbon and paper are not following the same path. In this case, the paper tracking may need to be re-adjusted. If there is no ribbon overlap, go on to Step 11.
11. To adjust the standoff you must loosen the left screw (on the component side of the PA/4000), then adjust the set screw for proper tracking. If the PA/4000 is a ribbon saver unit, make this adjustment by loosening the two screws at the end of the extrusion and then adjusting the pinch roller.
12. Secure the ribbon to the ribbon rewind and advance several labels.
13. Check for rippling in the ribbon as it travels from the printhead to the rewind. If there is rippling evident, the ribbon shield needs to be adjusted as described in Step 14 below. If the ribbon has even tension across the entire width, no further ribbon adjustment is necessary.
14. To adjust the ribbon shield: Move the ribbon temporarily and loosen the screw located on the left end of the shield. This end of the shield can then be adjusted up or down to even the ribbon tension across the full width of the ribbon.
15. Continue feeding labels. If necessary, go back to Step 14 and re-adjust the ribbon shield to prevent any rippling of the ribbon.

### **2.4.3 LABEL EDGE SENSOR ADJUSTMENT**

The label edge sensor is designed so that it rarely needs adjustment. However, if components in this circuit are ever replaced, you may need to follow the initial sensor set-up procedure.

1. Locate the sensor assembly. It is a pair of long narrow metal guides with circuit boards within it. It is connected to the front panel board by a cable and is on a shaft that goes through the center plate of the PA/4000 just below the printhead.
2. With label stock loaded in the PA/4000, remove some labels from the backing and position the backing material in between the "fingers" of the sensor board.
3. Connect a voltmeter to the circuit as follows: black lead to the heat sink and red lead to TP1, located in the upper left-hand corner of the control board.
4. Adjust potentiometer R43 (this is the lower one), located on the application board for a reading of .25 volts DC ( $\pm 10\%$ ).
5. Press the FEED button on the front panel of the Prodigy Plus. After feeding several labels for an automatic self-alignment procedure, the PA/4000 should advance one label at a time. The voltage at TP1 should go above 2 volts DC.

#### **2.4.4 DARKNESS ADJUSTMENT**

You can adjust the Darkness value using the Hand-Held Terminal. Pressing the arrow up key increases the burn time of the printhead, thus producing a darker image on the label. Pressing the arrow down key decreases the burn time of the printhead thus lightening the image on the label.

This adjustment should be used after printhead replacement to supplement the difference in printhead characteristics. Do not adjust the Darkness to make up for other PA/4000 adjustments, this could lead to print quality problems in the future.

#### **2.4.5 ADJUSTING THE AIR ASSIST TUBE**

1. Turn the PA/4000's power switch to the OFF position.
2. Loosen the Air Assist tube mounting bolts using a 9/64 Allen wrench.
3. Rotate the Air Assist tube to a position where the air holes blow directly onto the Tamp Pad.
4. Test by Feeding labels until the label lays correctly on the pad.

#### **2.4.6 ADJUSTING THE AUTO-RETRACT SENSOR**

1. Locate the Auto-Retract Sensor on the Tamp Pad.
2. Loosen the screw holding the sensor to the pad using a flat head screwdriver.
3. Move the Auto-Retract sensor down to see the product sooner - retract sooner - Too hard.

4. Move the Auto-Retract sensor up to see the product later - retract later - Too soft.

The auto-retract sensor must be positioned slightly above the level of the pad contact surface. If the sensor is positioned even with or below the pad contact surface, the auto-retract will not function correctly. **MAKE SURE THE SENSOR DOES NOT EXTEND PAST THE EDGE OF THE PAD OR IT WILL BE CRUSHED BY THE IMPACT.**

## 2.5 TESTING THE PA/4000

### 2.5.1 RIBBON TEST

1. Turn the PA/4000's power switch to the ON position.
2. Press and hold the following keys in this order: **2nd, STOP/CLEAR, FEED**
3. Release all three keys simultaneously.
4. Press the **PAUSE/RESUME** key. (The ERROR LED will blink).
5. The PA/4000 will now print multiple copies of the label shown in Figure 2-8.
6. Pull the labels away from the present sensor as they print.



Figure 2-8

### 2.5.2 PRODIGY BOARD SELF-TEST

1. Turn the PA/4000's power switch to the ON position.
2. Press and hold the following keys in this order: **2nd, STOP/CLEAR, FEED**
3. Release all three keys simultaneously.
4. Press the **FEED** key. (The ERROR LED will blink).
5. The PA/4000 will now print multiple copies of the label shown in Figure 2-8.
6. Pull the labels away from the present sensor as they print.

```

THU  NOVEMBER   17, 1994  12:25   321
VER  BA - 03.02   04/08/94
SYSTEM ROM CHECKSUM 8F7B  IS  GOOD
FONT   ROM CHECKSUM 2E7A  IS  GOOD
TOTAL  ROM CHECKSUM BDF5  IS  GOOD
SYSTEM RAM CHECKS GOOD
SERIAL PORT BAUD RATE IS 9600

TRANSFER SWITCH IS ON
SETUP SWITCH 1      2      3      4
5      6      7      8      OFF OFF OFF
OFF OFF OFF OFF OFF

ANALOG INPUT VALUES:
PAPER: 236  EDGE: 184  TEMP  064
POT ADJ: 139 BAT VOL: 204

INCH COUNTER  DATE SET      11/14/94
TOTAL LABEL LENGTH IN INCHES 000000170

```

**Figure 2-9**

## Explanation of the Configuration Test Label

The following is an explanation of the Configuration Label in Figure 2-9.

**THU NOVEMBER 17, 1994 12:25 321**

This line contains the date and time. You can set the date using Performance Series Software.

**VER BA - 03.02 04/08/94**

This line contains the PA/4000's firmware version level.

**SYSTEM ROM CHECKSUM 8F7B IS GOOD  
 FONT ROM CHECKSUM 2E7A IS GOOD  
 SYSTEM ROM CHECKSUM BDF5 IS GOOD  
 SYSTEM RAM CHECKS GOOD**

These lines list the results and values of all RAM and ROM Checksums.

**SERIAL PORT BAUD RATE IS 9600**

This line contains the PA/4000's Serial Port baud rate setting.

**TRANSFER SWITCH IS ON**

This line states whether the Transfer setting is ON or OFF.



SETUP SWITCH	1	2	3	4	5	6
7	8					
		OFF	OFF	OFF	OFF	OFF
		OFF	OFF	OFF	OFF	OFF

This line contains the positions of the PA/4000's DIP switches.

#### ANALOG INPUT VALUES:

PAPER: 236    EDGE: 184    TEMP: 064  
 POT ADJ: 139    BAT VOL: 204

These lines list the values of the sensors and adjustment potentiometers within the Printer.

INCH COUNTER	DATE SET	11/14/94
TOTAL LABEL LENGTH IN INCHES		000000170

These lines contain the Printers internal counter information. It includes the counter set date and the total amount in inches (10 inch increments) of labels printed.

### 2.5.3 APPLICATOR RESET

1. Turn the PA/4000's power switch to the ON position.
2. Press and hold the following keys in this order: **2nd, STOP/CLEAR, FEED**
3. Release all three keys simultaneously.
4. Press the **MENU** key. (The ERROR LED will blink).

### 2.5.4 PRODIGY PLUS RESET

1. Turn the PA/4000's power switch to the ON position.
2. Press and hold the following keys in this order: **2nd, STOP/CLEAR, FEED**
3. Release all three keys simultaneously.
4. Press the **STOP/CLEAR** key. (The ERROR LED will blink).

## **SECTION 3: TECHNICAL DOCUMENTATION**

This section contains all the technical documents you will need to service the PA/4000. To use this section, first locate the appropriate assembly using the Family Tree in Section 3.1. Next, use Table 3-1 to locate the correct Engineering Drawing in Section 3.2. If you need to replace the assembly, see Section 3.3 for the part number of the correct Spare Parts Kit.

*NOTE: The information in this section is CONFIDENTIAL and cannot be copied, reproduced or duplicated without the written consent of Diagraph Corporation.*

### **3.1 FAMILY TREE**

## 3.2 ENGINEERING DRAWINGS

TITLE	PART NUMBER
Pinch Roller Assembly	6105-016
PA/4000 Final Assembly	6105-100
PA/4000 Wiring Diagram	6105-100
Engine Assembly	6105-101
Secondary Wipe-Down Assembly	6105-103
Air Supply Assembly	6105-107
Secondary Wipe-Down Control Logic Box	6105-143
Electrical Box Assembly	6105-150
Tamp Assembly	6105-180/181/182
PA/4000 Tension Assembly	6105-290
PA/4000 Rewind Assembly	6105-292
PA/4010, PA/4015 Systems	6105-406/412/418
PA/4020 System	6105-506
PA/4000 Tamp Pad Assemblies	6105-OWWWLLL

**Table 3-1**

NOTE: *The following drawings are for reference only. Not all of the parts listed in Sections 3.2 and 3.3 are available for sale as individual items. Diagraph reserves the right to supply only the main assemblies and spare parts kits. Refer to Section 3.3 for more information on spare parts kits and standard parts available.*

### 3.3 SPARE PARTS KITS

6105-185 PA/4000 Level 1 Kit (Mech)

*Applies to all Rev. Levels*

Kit #6105-185 includes:	Description	Quantity
6105-383	Fuse, 2.0 Amp	2
1770-036	Gauge	1
1770-078	Regulator	1
2801-022	Printhead, Prodigy Plus	1
2801-033	Roller, Label Driver	1
2801-130	Disk, Friction Ribbon	2
2801-131	Slip Pulley Assembly - Prodigy Plus	1
2801-590	Washer, Spring	1
2801-635	Head Adjust Spring	1
2801-637	Spring, Supply Tension	1
2801-638	Spring	1
2801-641	Pulley, Slip Clutch	1
2801-758	Hub Flat Spring 1" Core	1
2801-759	Spring 1" Rewind Retrofit	1
2801-817	Roller, Label Assist	1
2801-822	Pulley, 48 GR Timing	1
2801-827	Pulley, Dampener	1
2801-828	Spring, Dampener	1
6105-026	Spring, Pinch Roller	1
6105-036	Peel Blade, PA/4000	1
6105-061	Rewind Belt	1
6105-062	Paper Drive Belt	1
6105-063	Ribbon Drive Belt	1
6105-064	Pulley, Rewind Driver	1
6105-066	Spring Collar, 5/8 ID	1
6105-117	Retainer, Belt	1
6105-124	Vacuum Unit	1
6105-276	Blow Tube Assembly	1
6105-322	Cartidge, Vacuum Filter	1
6105-367	Clutch and Pulley Assembly	1
6105-386	Jig, Printhead Cable	1
7501-021	Replacement Element, Filter	1

**6105-186 PA/4000 Level II Kit (Elect)**

*Applies to Rev. Levels A-J*

Kit #6105-186 includes:	Description	Quantity
2801-027AS	Prodigy Plus Board Assembly, MOD	1
2801-811	Rectifier Bridge	1
5700-216	Photocell Assembly	1
6105-045	Cable Assembly, Ribbon Sensor	1
6105-046	Cable Ass'y, Paper Edge Sensor	1
6105-047	Cable Assembly, Sensor Label Low	1
6105-050	Cable Assembly, Stepper Motor	1
6105-095	Magnetic Switch	1
6105-119	Applicator Board	1
6105-123	Valve, 24VDC	1
6105-260	Hand-Held Controller	1
6105-296	Sensor, Low-Label PA/4000	1
6105-383	Fuse, 2.0 AMP	2
6105-401	PA/4000 Transformer Retro-Fit Kit	1

**6105-193 PA/4000 Level II Kit (Elect.)**

*Applies to Rev. K and Greater*

Kit #6105-193 includes:	Description	Quantity
6105-383	Fuse, 2.0 AMP	2
2801-027	PC Board Ass'y, Prodigy Plus	1
2801-811	Rectifier Bridge	1
5700-216	Photocell Assembly	1
6105-045	Cable Assembly, Ribbon Sensor	1
6105-046	Cable Ass'y, Paper Edge Sensor	1
6105-047	Cable Assembly, Sensor Label Low	1
6105-050	Cable Assembly, Stepper Motor	1
6105-095	Switch, Magnetic	1
6105-119	Board, Applicator	1
6105-123	Valve, 24 VDC	1
6105-260	Controller, Hand Held	1
6105-296	Sensor, Low Label PA/4000	1
6105-391	Transformer Ass'y, PA/4000 115/230V	1

**6105-187 Secondary Wipe-Down Level I Kit (Mech.)**

Kit #6105-187 includes:	Description	Quantity
1741-002	Spring, Torsion – Right	1
1741-003	Spring, Torsion, Left	1
1770-036	Gauge	1
1770-078	Regulator	1
6105-092	Tamp Cylinder, 12" Twin Rod	1
6105-141	Roller, Latex (White) 2.0 X 4.5	1

**6105-188 Secondary Wipe-Down, Level II Kit (Elec.)**

*This applies to Rev A & B Secondary Wipe-Down Units*

Kit #6105-187 includes:	Description	Quantity
5700-216	Photocell Assembly	1
6101-000	Banner On/Off Delay	1
6101-001	Banner One Shot Logic	1
6101-002	Banner Latch Logic	1
6105-123	Valve, 24 VDC	1
6105-174	Switch Ass'y, Magnetic Twin Rod	1

**6105-192 Secondary Wipe-Down, Level II Kit (Elec.)**

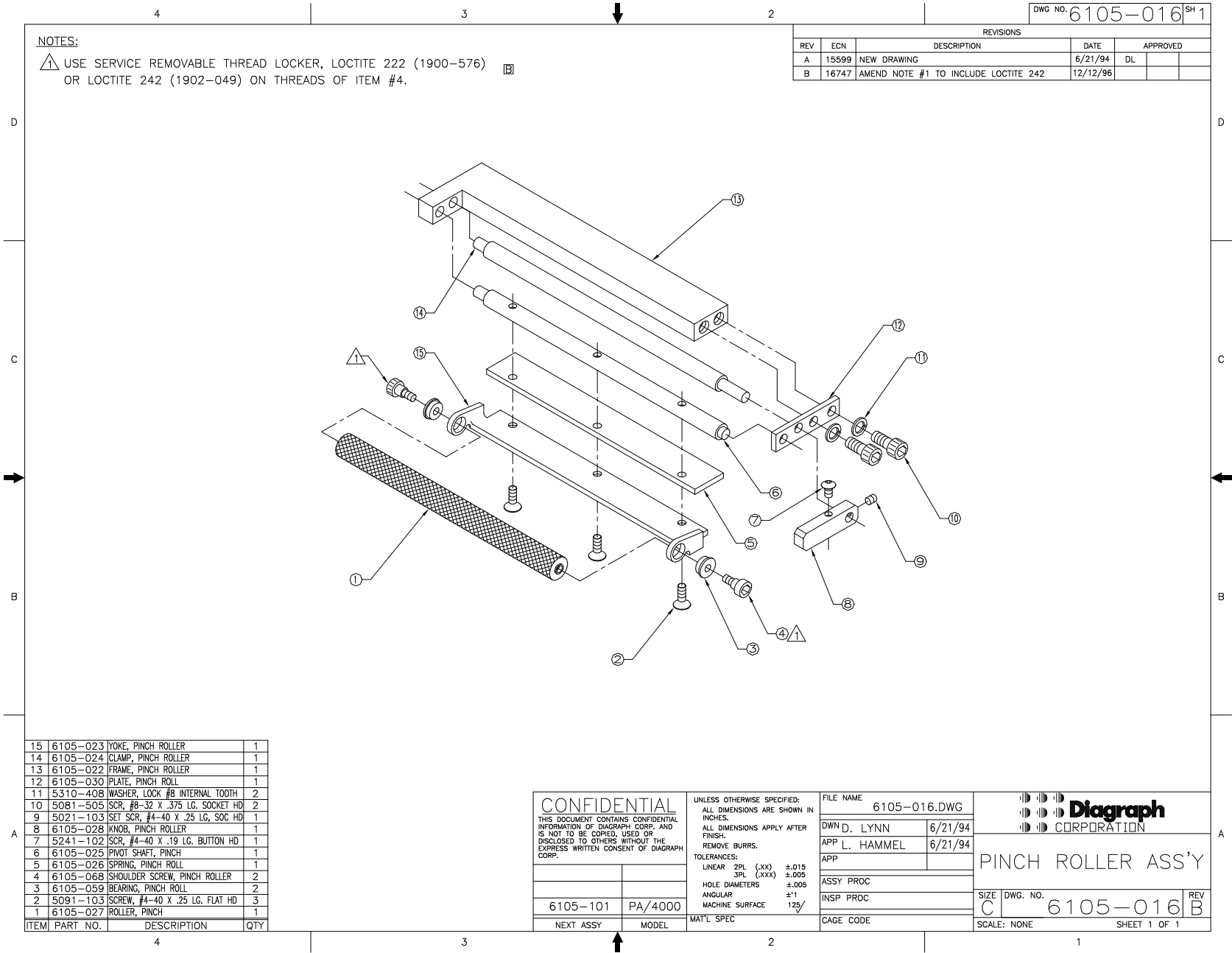
*This applies to Rev. C Secondary Wipe-Down Units*

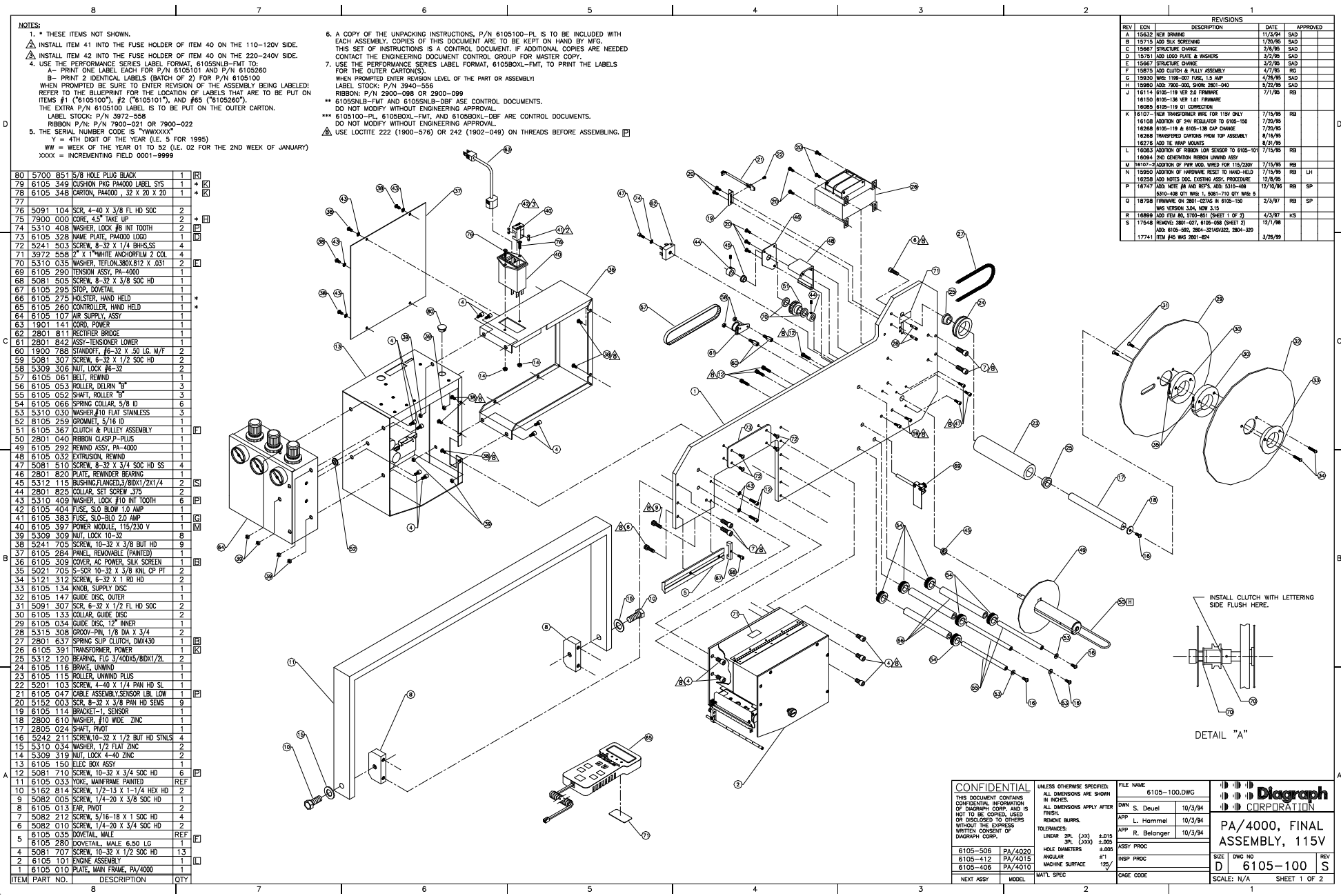
Kit #6105-192 includes:	Description	Quantity
5700-216	Photocell Assembly	1
6105-123	Valve, 24 VDC	1

### 3.4 SPECIFICATIONS

	PA/4010 Tamp	PA/4015 Pallet	PA/4020 Dual Panel
<b>Print Method</b>	Direct Thermal/ Thermal Transfer		
<b>Print Speed</b>	Software selectable up to 8 inches (203mm) per second		
<b>Print Resolution</b>	203 dpi (8 dots per mm)		
<b>Application Methods</b>	Tamp	Tamp with auto-retract	Tamp with secondary wipe-down mechanism
<b>Media Minimum</b>	2 in. x 1 in. (50.8 mm x 25.4 mm)		2 in. x 6 in. (50.8 mm x 152.4 mm)
<b>Media Maximum</b>	4.5 in. x 10 in. (115.7 mm x 25.4 mm)		4.5 in. x 13 in. (115.7 mm x 330 mm)
<b>Roll Capacity</b>	12 inches (308 mm) outer diameter		
<b>Fonts</b>	Printer resident: Nine alphanumeric fonts: OCR-A, OCR-B, built-in smooth font (CG Triumvirate). All fonts expandable 10x.		
<b>Bar Codes</b>	Code 39, Interleaved 2 of 5, UPC-A, UPC-E, UPC 2 and 5 digit addenda, UPC random weight, EAN-8, EAN-13, EAN 2 and 5 digit addenda, Code 128, A, B and C, CODABAR, LOGMARS, MSI Plessey, Code 93, UPC-SCS, Postnet, PDF417		
<b>Interfaces</b>	Standard RS-232, RS-422 Optional: Protocol converters for Twinax/Coax connectivity		
<b>Air</b>	60 psi		
<b>Electrical</b>	110/120 VAC, 50/60 Hz		
<b>Weight</b>	Approximately 40-45 lbs. (18-20 kg) without applicator		
<b>Dimensions</b>	Approximately 20 in. H x 25 in. W x 14 in. D (50.8 cm x 63.5 cm x 36 cm) without applicator		
<b>Options</b>	Extended length air cylinder, Performance Series DOS or Windows, custom software, alert/warning beacon, material handling equipment, bar code verifiers, on-line scanners, Twinax/Coax protocol converters		







- NOTES:
- 1. \* THESE ITEMS NOT SHOWN.
  - 2. INSTALL ITEM 41 INTO THE FUSE HOLDER OF ITEM 40 ON THE 110-120V SIDE.
  - 3. INSTALL ITEM 42 INTO THE FUSE HOLDER OF ITEM 40 ON THE 220-240V SIDE.
  - 4. USE THE PERFORMANCE SERIES LABEL FORMAT, 6105SNLB-FMT TO:
    - A- PRINT ONE LABEL EACH FOR P/N 61050101 AND P/N 6105260
    - B- PRINT 2 IDENTICAL LABELS (BATCH OF 2) FOR P/N 6105100WHEN PROMPTED, ENTER THE YEAR OF THE ASSEMBLY BEING LABELED. REFER TO THE BLUEPRINT FOR THE LOCATION OF LABELS THAT ARE TO BE PUT ON ITEMS #1 ("6105100"), #2 ("6105101"), AND #65 ("6105260"). THE EXTRA P/N 6105100 LABEL IS TO BE PUT ON THE OUTER CARTON.
  - 5. LABEL STOCK: P/N 3972-508
  - 6. RIBBON P/N: P/N 7900-021 OR 7900-022
  - 7. THE SERIAL NUMBER CODE IS "YHXXXXX"
  - 8. Y = 4TH DIGIT OF THE YEAR (I.E. 5 FOR 1995)
  - 9. WW = WEEK OF THE YEAR 01 TO 52 (I.E. 02 FOR THE 2ND WEEK OF JANUARY)
  - 10. XXXX = INCREMENTING FIELD 0001-9999

- 11. A COPY OF THE UNPACKING INSTRUCTIONS, P/N 6105100-PL IS TO BE INCLUDED WITH EACH ASSEMBLY. COPIES OF THIS DOCUMENT ARE TO BE KEPT ON HAND BY MFG. THIS SET OF INSTRUCTIONS IS A CONTROL DOCUMENT. IF ADDITIONAL COPIES ARE NEEDED CONTACT THE ENGINEERING DOCUMENT CONTROL GROUP FOR MASTER COPY.
- 12. USE THE PERFORMANCE SERIES LABEL FORMAT, 6105BOLX-FMT, TO PRINT THE LABELS FOR THE OUTER CARTON(S).
- 13. WHEN PROMPTED, ENTER REVISION LEVEL OF THE PART OR ASSEMBLY.
- 14. LABEL STOCK: P/N 3940-050
- 15. RIBBON: P/N 2900-098 OR 2900-099
- 16. 6105SNLB-FMT AND 6105SNLB-DBF ARE CONTROL DOCUMENTS.
- 17. DO NOT MODIFY WITHOUT ENGINEERING APPROVAL.
- 18. 6105100-PL, 6105BOLX-FMT, AND 6105BOLX-DBF ARE CONTROL DOCUMENTS.
- 19. DO NOT MODIFY WITHOUT ENGINEERING APPROVAL.
- 20. USE LOCTITE 222 (1900-576) OR 242 (1902-049) ON THREADS BEFORE ASSEMBLING.

ITEM	PART NO.	DESCRIPTION	QTY
80	5700	851/8 HOLE PLUG BLACK	1
79	6105	349 CUSHION PMS PA4000 LABEL SYS	1
78	6105	348 CARTON, PA4000, 32 X 20 X 20	1
77			
76	5091	104 SCR, 4-40 X 3/8 FL HD SOC	2
75	7900	000 CORD, 4.2' TAKE UP	2
74	5310	408 WASHER, LOCK #8 INT TOOTH	2
73	6105	328 NAME PLATE, PA4000 LOGO	1
72	5241	503 SCREW, 8-32 X 1/4 BHS,SS	4
71	3972	558 2" T-WHITE ANCHORFLIM 2 COL	4
70	5310	035 WASHER, TETON,360T,812 X .031	1
69	6105	290 TENSION ASSY, PA-4000	1
68	5081	505 SCREW, 8-32 X 3/8 SOC HD	1
67	6105	295 STOP, DOVETAIL	1
66	6105	275 HOLSTER, HAND HELD	1
65	6105	260 CONTROLLER, HAND HELD	1
64	6105	107 AIR SUPPLY, ASSY	1
63	1901	141 CORD, POWER	1
62	2801	811 RECTIFIER BRIDGE	1
61	2801	842 ASSY-TENSIONER LOWER	1
60	1900	788 STANDOFF, #8-32 X .50 LG, M/F	2
59	5081	307 SCREW, 6-32 X 1/2 SOC HD	2
58	5309	306 NUT, LOCK #6-32	2
57	6105	061 BELT, REWIND	1
56	6105	053 ROLLER, DELFIN 3"	3
55	6105	052 SHFT, ROLLER 3"	3
54	6105	066 SPRING COLLAR, 5/8 ID	6
53	5310	030 WASHER, #10 FLAT STAINLESS	3
52	8105	259 GROMMET, 5/16 ID	1
51	6105	367 CLUTCH & PULLEY ASSEMBLY	1
50	2801	040 RIBBON, 2000-P-PLUS	1
49	6105	292 REWIND ASSY, PA-4000	1
48	6105	032 EXTRUSION, REWIND	1
47	5081	510 SCREW, 8-32 X 3/4 SOC HD SS	4
46	2801	820 PLATE, REWINDER BEARING	1
45	5312	115 BEARING, FLANGED, 3/80X1/2X1/4	2
44	2801	825 COLLAR, SET SCREW .375	2
43	5310	409 WASHER, LOCK #10 INT TOOTH	6
42	6105	404 FUSE, SLO-BLOW 1.0 AMP	1
41	6105	383 FUSE, SLO-BLOW 2.0 AMP	1
40	6105	397 POWER MODULE, 115/230 V	1
39	5309	309 NUT, LOCK 10-32	8
38	5241	705 SCREW, 10-32 X 3/8 BUT HD	9
37	6105	284 PANEL, REMOVABLE (PAINTED)	1
36	6105	308 COVER, AC POWER, SILK SCREEN	1
35	5021	705 S-SCR 10-32 X 3/8 KHL CP PT	2
34	5121	312 SCREW, 6-32 X 1 RD HD	2
33	6105	134 KNOB, SUPPLY DISC	1
32	6105	147 GUIDE DISC, OUTER	1
31	5081	307 SCR, 6-32 X 1/2 FL HD SOC	2
30	6105	133 COLLAR, GUIDE DISC	2
29	6105	034 GUIDE DISC, 12" INNER	1
28	5315	308 GROOV-PIN, 1/8 DIA X 3/4	2
27	2801	637 SPRING SLIP CLUTCH, DMX430	1
26	6105	391 TRANSFORMER, POWER	1
25	5312	120 BEARING, FLG 3/400X5/80X1/2	2
24	6105	116 BRAKE, UNWIND	1
23	6105	115 ROLLER, UNWIND PLUS	1
22	5201	103 SCREW, 5/16-18 X 1 SOC HD SL	1
21	6105	047 CABLE ASSEMBLY, SENSOR LK LOW	1
20	5152	003 SCR, 8-32 X 3/8 PAN HD SEMS	9
19	6105	114 BRACKET-1, SENSOR	1
18	2800	610 WASHER, #10 WIDE ZINC	1
17	2805	024 SHFT, PILOT	1
16	5242	211 SCREW, 10-32 X 1/2 BUT HD STMS	4
15	5310	034 WASHER, 1/2 FLAT ZINC	2
14	5309	319 NUT, LOCK 4-40 ZINC	2
13	6105	150 ELEC BOX ASSY	1
12	5081	710 SCREW, 10-32 X 3/4 SOC HD	6
11	6105	033 KNOB, MAIN FRAME PAINTED	REF
10	5162	814 SCREW, 1/2-13 X 1-1/4 HEX HD	2
9	5082	005 SCREW, 1/4-20 X 3/8 SOC HD	1
8	6105	013 EAR, PILOT	2
7	5082	212 SCREW, 5/16-18 X 1 SOC HD	4
6	5082	010 SCREW, 1/4-20 X 3/4 SOC HD	2
5	6105	035 DOVETAIL, MALE	REF
4	5081	707 SCREW, 10-32 X 1/2 SOC HD	13
2	6105	101 ENGINE ASSEMBLY	1
1	6105	010 PLATE, MAIN FRAME, PA/4000	1

REVISIONS				
REV	ECN	DESCRIPTION	DATE	APPROVED
A	15632	NEW DRAWING	11/2/94	SAD
B	15715	ADD BLK SCREENING	1/20/95	SAD
C	15667	STRUCTURE CHANGE	2/6/96	SAD
D	15751	ADD 1000 PLATE & WASHERS	3/2/96	SAD
E	15667	STRUCTURE CHANGE	3/2/96	SAD
F	15875	ADD CLUTCH & PULLEY ASSEMBLY	4/7/96	RG
G	15830	WMS 1196-007 FUSE, 1.5 AMP	4/28/96	SAD
H	15980	ADD 7900-000, SHOE 2801-040	5/22/96	SAD
J	16114	6105-119 VER 2.0 FIRMWARE	7/7/96	RB
K	16190	6105-136 VER 1.01 FIRMWARE	7/7/96	RB
L	16085	6105-119 Q1 CONNECTION	7/7/96	RB
M	16107	NEW TRANSFORMER WIRE FOR 115V ONLY	7/15/96	RB
N	16108	ADDITION OF 24V REGULATOR TO 6105-100	7/20/96	RB
O	16268	6105-119 & 6105-136 QUP CHANGE	7/20/96	RB
P	16268	TRANSFERRED CARTONS FROM TOP ASSEMBLY	8/16/96	RB
Q	16276	ADD RE WSP MOUNTS	8/25/96	RB
R	16583	ADDITION OF RIBBON LOW SENSOR TO 6105-101	7/15/96	RB
S	16594	2ND GENERATION RIBBON UNWIND ASSY	7/15/96	RB
T	16107	ADDITION OF PWR MOD WIRE TOP 115/230V	7/15/96	RB
U	15950	ADDITION OF HARDWARE RESET TO HAND-HELD	7/15/96	RB
V	16258	ADD NOTES DOC, EXISTING ASSY. PROCEDURE	12/8/96	RB
W	16747	ADD NOTE #6 AND NOTE ADD 5310-400	12/10/96	RB
X	16798	FIRMWARE ON 2801-02745 IN 6105-100	2/3/97	RB
Y	16899	ADD ITEM 80, 3100-801 (SHEET 1 OF 2)	4/3/97	KS
Z	17548	REMOVE 2801-007, 6105-008 (SHEET 2)	12/1/98	RB
1	17741	ITEM #45 WAS 2801-824	3/28/99	RB

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UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE SHOWN IN INCHES. ALL DIMENSIONS APPLY AFTER FINISH. REMOVE BURRS.

TOLERANCES:

LINEAR	SPL (XXX)	±.015
	SPL (XXXX)	±.005
HOLE DIAMETERS		±.005
ANGULAR		±1°
MACHINE SURFACE		125°

NEXT ASSY: MODEL:

FILE NAME: 6105-100.DWG

DWN	S. Deuel	10/3/94
APP	L. Hommel	10/3/94
APP	R. Belonger	10/3/94

ASSY PROC

INSP PROC

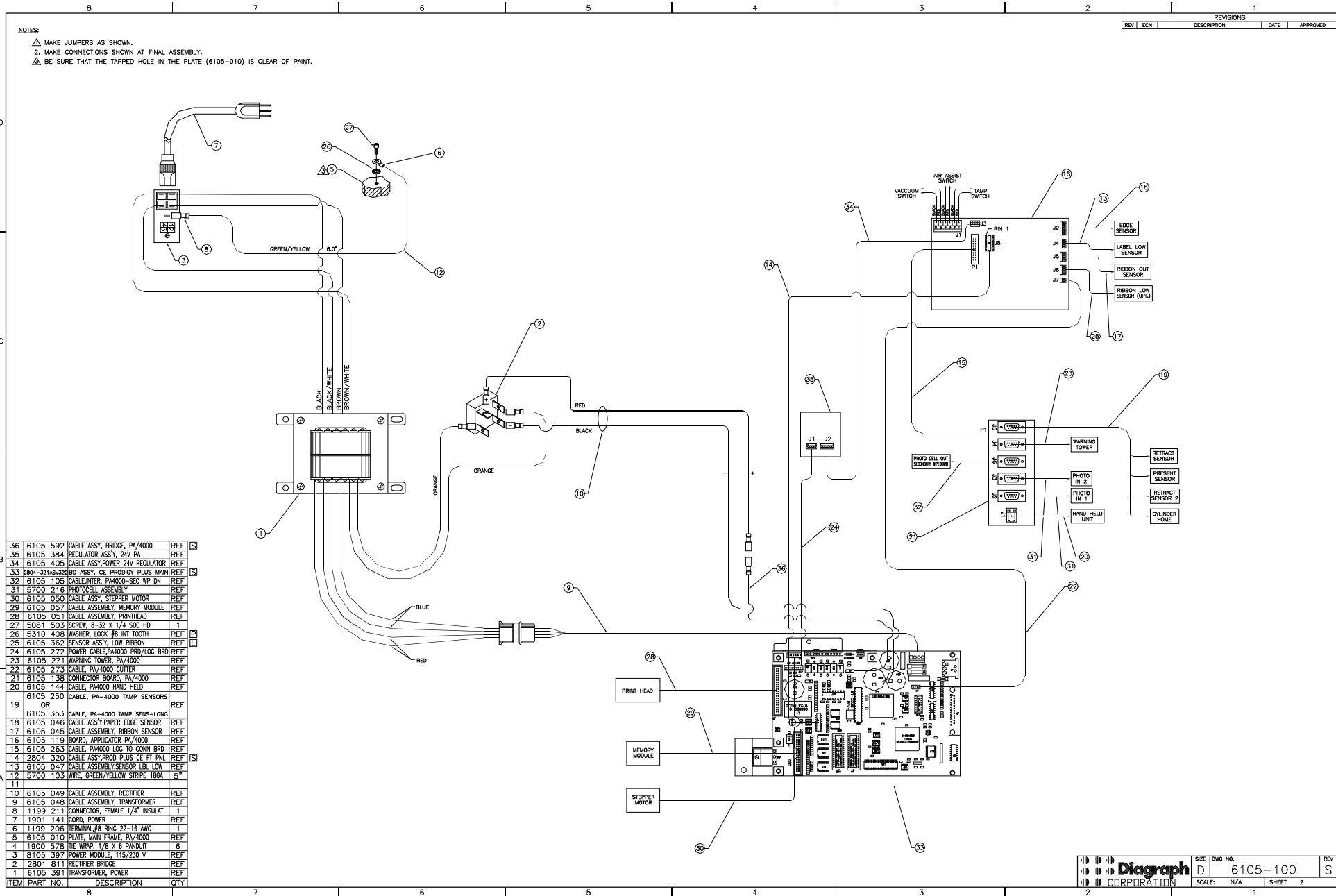
CAGE CODE

**Diagraph CORPORATION**

**PA/4000, FINAL ASSEMBLY, 115V**

SIZE	DWG NO	REV
D	6105-100	S

SCALE: N/A SHEET 1 OF 2

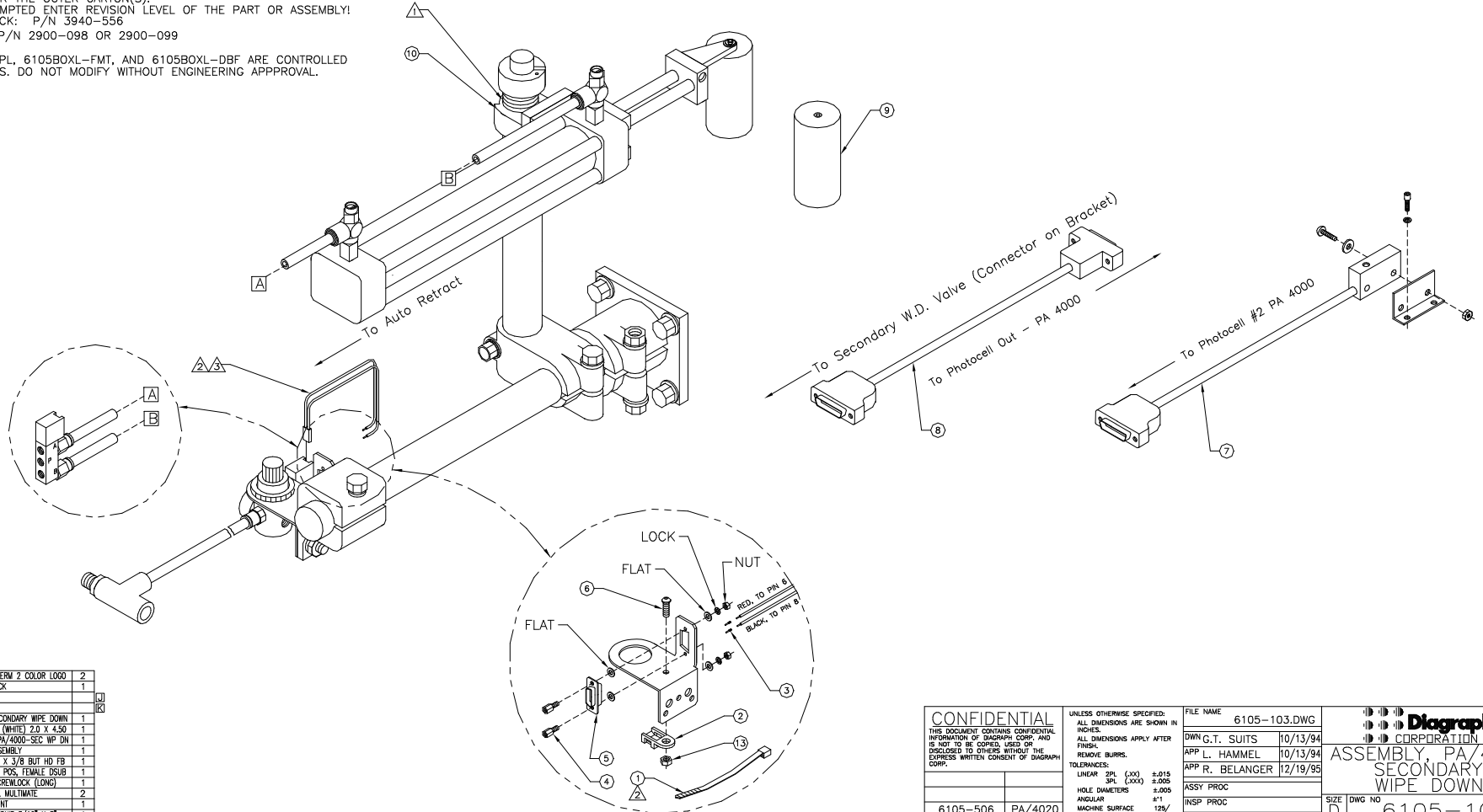




## Notes:

- ⚠ ALL UNITS ARE ASSEMBLED AS RIGHT HANDED USING THE 1741-002 RIGHT HANDED TORSION SPRING. THE 1741-003 LEFT HANDED TORSION SPRING IS INCLUDED TO ALLOW FOR LEFT HANDED CONVERSIONS IN THE FIELD.
- ⚠ USE TIE WRAP TO SECURE WIRES GOING TO VALVE.
- ⚠ CONNECTOR AND WIRES ARE PART OF THE VALVE INCLUDED WITH ITEM 10.
- ⚠ A COPY OF THE UNPACKING INSTRUCTIONS, P/N 6105103-PL IS TO BE INCLUDED WITH EACH ASSEMBLY. COPIES OF THIS DOCUMENT ARE TO BE KEPT ON HAND BY MFG. THIS SET OF INSTRUCTIONS IS A CONTROL DOCUMENT, IF ADDITIONAL COPIES ARE NEEDED CONTACT THE ENGINEERING DOCUMENT CONTROL GROUP FOR MASTER COPY.
- ⚠ USE THE PERFORMANCE SERIES LABEL FORMAT, 6105BOXL-FMT, TO PRINT THE LABELS FOR THE OUTER CARTON(S). WHEN PROMPTED, ENTER REVISION LEVEL OF THE PART OR ASSEMBLY! LABEL STOCK: P/N 3940-556 RIBBON: P/N 2900-098 OR 2900-099
- \* 6105103-PL, 6105BOXL-FMT, AND 6105BOXL-DBF ARE CONTROLLED DOCUMENTS. DO NOT MODIFY WITHOUT ENGINEERING APPROVAL.

REVISIONS				
REV	ECH	DESCRIPTION	DATE	APPROVED
A	15628	NEW DRAWING	12/13/94	TS
B	15770	DROP: 5361-904, ADD: 2805-277 (3)	2/23/95	MS
C	15819	DROP: 5082-010, ADD: 5310-031 5310-305	3/9/95	TS
D	15848	ADD PACKING CARTONS	3/31/95	SAD
E	15968	ADD 5802-930, ASS'Y MANUAL	4/27/95	SAD
F	15993	CH: 6105-105,-153,-143, 5700-216 TO REF	5/19/95	SAD
G	16003	WAS: 5310-011 WASHER, FLAT 1/4 (4)	5/15/95	RG
H	16174	DROPPED CONTROL BOX 6105-143	11/1/95	RJB SP
I	16258	ADD NOTES DOC. EXISTING ASS'Y PROCEDURE	12/08/95	RJB SP
J	16691	DROP: 6105-350 (ADD TO 6105-190)	10/3/96	MO SP
K	16758	DROP: 6105-345, CARTON (ADD TO 6105-190)	12/13/96	RB



14	3940-556	4" X 3" LTS PERM 2 COLOR LOGO	2
13	5309-306	NUT, 6-32 LOCK	1
12			
11			
10	6105-190	SUB ASSY, SECONDARY WIPE DOWN	1
9	6105-141	ROLLER, LATEX (WHITE) 2.0 X 4.50	1
8	6105-105	CABLE INTER. PA/4000-SEC WP DN	1
7	5700-216	PHOTOCELL ASSEMBLY	1
6	5241-305	SCREW, #6-32 X 3/8 BUT HD FB	1
5	2805-278	RECEPTACLE, 9 POS, FEMALE DSUB	1
4	2800-434	KIT, FEMALE SCREWLOCK (LONG)	1
3	1900-565	SOC CONTACTS, MULTIMATE	2
2	1900-442	CABLE TIE MOUNT	1
1	1900-372	TIE WRAPS PANOUT 3/16" X 3"	1
ITEM	PART NO.	DESCRIPTION	QTY

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6105-506 PA/4020

UNLESS OTHERWISE SPECIFIED:  
ALL DIMENSIONS ARE SHOWN IN INCHES.  
ALL DIMENSIONS APPLY AFTER FINISH.  
REMOVE BURRS.  
TOLERANCES:  
LINEAR .25PL (.XXX) ±.015  
3PL (.XXX) ±.005  
HOLE DIAMETERS ±.005  
ANGULAR ±1°  
MACHINE SURFACE 125/

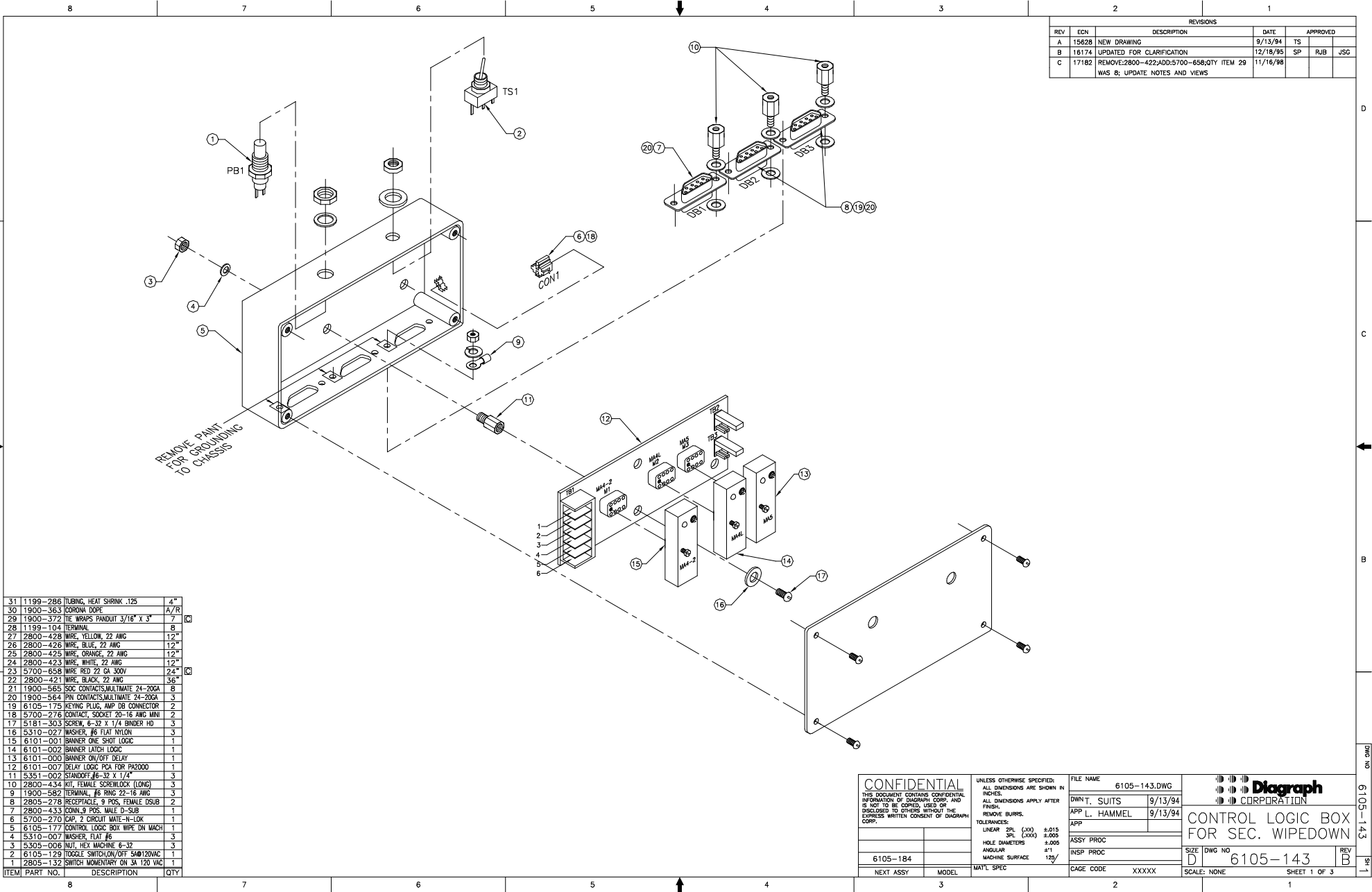
WAT'L SPEC

FILE NAME 6105-103.DWG  
DWG G.T. SUITS 10/13/94  
APP L. HAMMEL 10/13/94  
APP R. BELANGER 12/19/95  
ASSY PROC  
INSP PROC  
CAGE CODE

Diagraph CORPORATION  
ASSEMBLY, PA/4000  
SECONDARY  
WIPE DOWN  
SIZE DWG NO 6105-103 K  
D 6105-103 K  
SCALE: NONE SHEET 1 OF 1

DWG NO 6105-103 SH 1

DWG NO 6105-107 SH 1



REVISIONS					
REV	ECN	DESCRIPTION	DATE	APPROVED	
A	15628	NEW DRAWING	9/13/94	TS	
B	18174	UPDATED FOR CLARIFICATION	12/18/95	SP	RJB JSG
C	17182	REMOVE:2800-422;ADD:5700-656;QTY ITEM 29 WAS 8; UPDATE NOTES AND VIEWS	11/16/98		

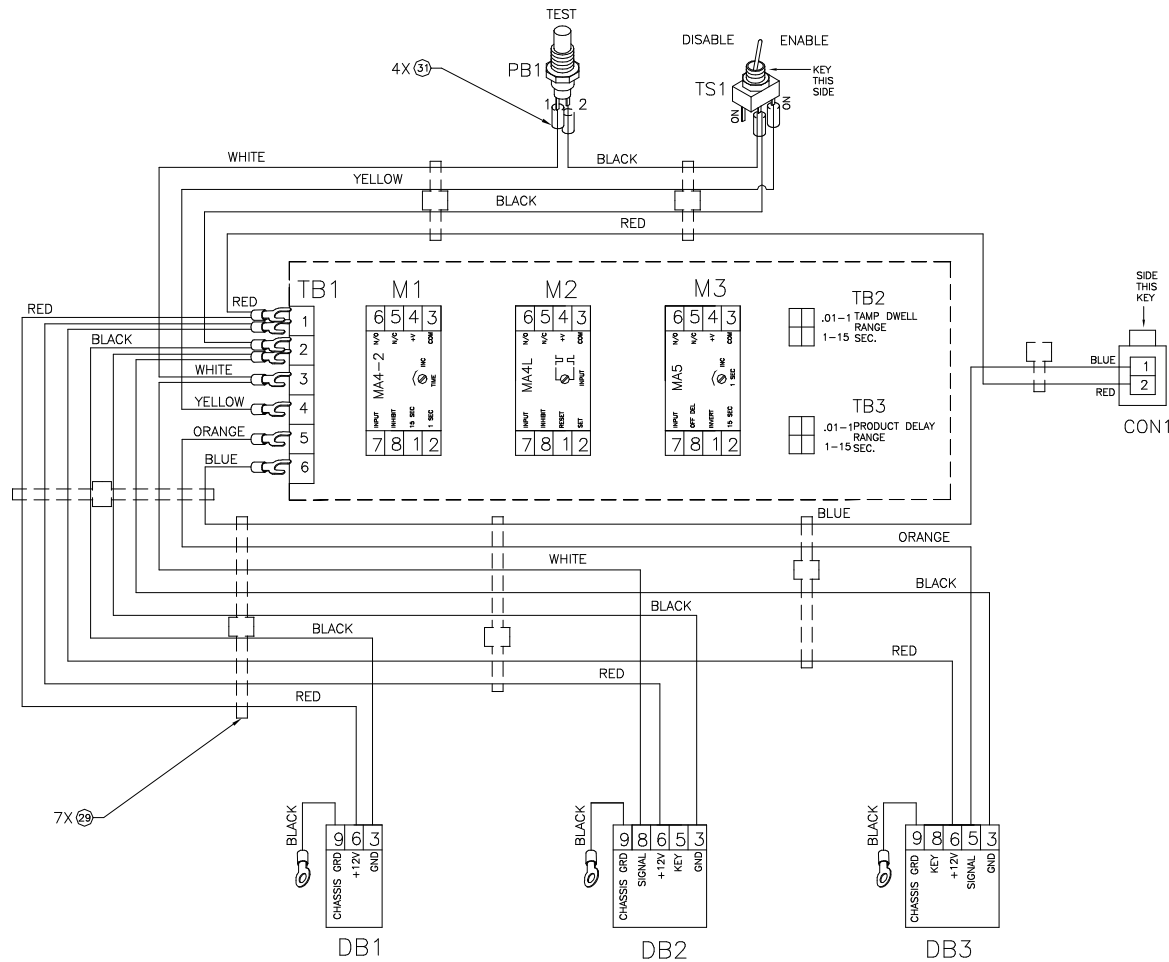
31	1199-286	TUBING, HEAT SHRINK .125	4"
30	1900-363	CORONA DOPE	A/R
29	1900-372	TIE WRAPS PANDUIT 3/16" X 3"	7
28	1199-104	TERMINAL	8
27	2800-428	WIRE, YELLOW, 22 AWG	12"
26	2800-426	WIRE, BLUE, 22 AWG	12"
25	2800-425	WIRE, ORANGE, 22 AWG	12"
24	2800-423	WIRE, WHITE, 22 AWG	12"
23	5700-658	WIRE RED 22 GA 300V	24"
22	2800-421	WIRE, BLACK, 22 AWG	36"
21	1900-565	SOC CONTACTS,MULTIMATE 24-20GA	8
20	1900-564	IPIN CONTACTS,MULTIMATE 24-20GA	3
19	8105-175	KEYING PLUG, AMP DB CONNECTOR	2
18	5700-276	CONTACT, SOCKET 20-16 AWG MINI	2
17	5181-303	SCREW, 6-32 X 1/4 BINDER HD	3
16	5310-027	WASHER, #6 FLAT NYLON	3
15	6101-001	BANNER ONE SHOT LOGIC	1
14	6101-002	BANNER LATCH LOGIC	1
13	6101-000	BANNER ON/OFF DELAY	1
12	6101-007	DELAY LOGIC PCA FOR PA2000	1
11	5351-002	STANDOFF, #6-32 X 1/4"	3
10	2800-434	KIT, FEMALE SCREWLOCK (LONG)	3
9	1900-582	TERMINAL, #6 RING 22-16 AWG	3
8	2805-278	RECEPIACLE, 9 POS, FEMALE DSUB	2
7	2800-433	CONN, 9 POS, MALE D-SUB	1
6	5700-270	CAP, 2 CIRCUIT MATE-N-LOK	1
5	6105-177	CONTROL LOGIC BOX WIRE ON MACH	1
4	5310-007	WASHER, FLAT #6	3
3	5305-006	NUT, HEX MACHINE 6-32	3
2	6105-129	TOGGLE SWITCH,ON/OFF 540120VAC	1
1	2805-132	SWITCH MOMENTARY ON 3A 120 VAC	1
ITEM	PART NO.	DESCRIPTION	QTY

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		DWNT, SUITS APP L. HAMMEL	9/13/94	
		APP		
		ASSY PROC		
		INSP PROC		
6105-184		CAGE CODE	XXXXXX	SIZE DWG NO D 6105-143
NEXT ASSY		MODEL		SCALE: NONE
		MAT'L SPEC		SHEET 1 OF 3

## NOTES:

1. ALL WIRES TO BE CONNECTED TO TB1 WITH TERMINALS (ITEM 28)
2. TERMINAL CONNECTIONS TO WITHSTAND A PULL TEST OF 20 IN/LBS @ 1 INCH PER SECOND.
3. ALL WIRES TO BE CONNECTED TO PB1 AND TS1: STRIP 3/8" INSULATION, WRAP 1 TURN, SOLDER AND COVER WITH HEATSHRINK (ITEM 31).
4. SET M1, M2, AND M3 TO LISTED PRESET LOCATIONS (SEE SHEET 3).
5. ALL CRIMP CONNECTIONS FOR SOCKETS AND PINS TO WITHSTAND A PULL TEST OF 12 IN/LBS @ 1 INCH PER SECOND.

REVISIONS					
REV	ECN	DESCRIPTION	DATE	TS	APPROVED
A	15828	NEW DRAWING	9/13/94		
B	16174	UPDATED FOR CLARIFICATION	12/18/95	SP	RJB JSG
C	17182	REMOVE:2800-422;ADD:5700-658;QTY ITEM 29 WAS 8; UPDATE NOTES AND VIEWS	11/16/98		



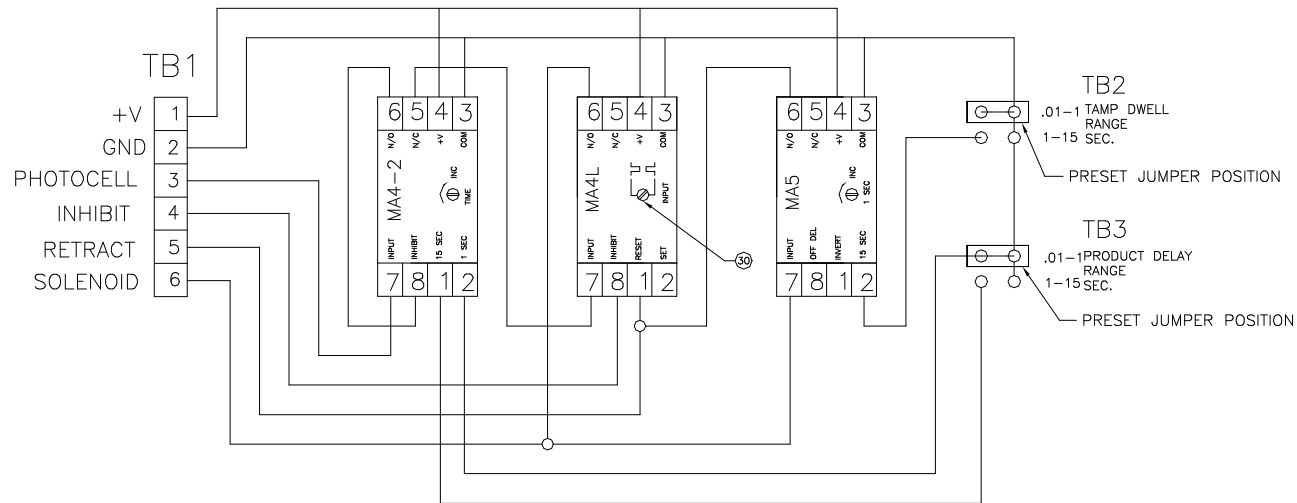
		SIZE	DWG NO.	REV
Diagraph CORPORATION		D	6105-143	C
DRAWN BY: T. SUITS		9/13/94	SCALE: NONE	SHEET 2 OF 3

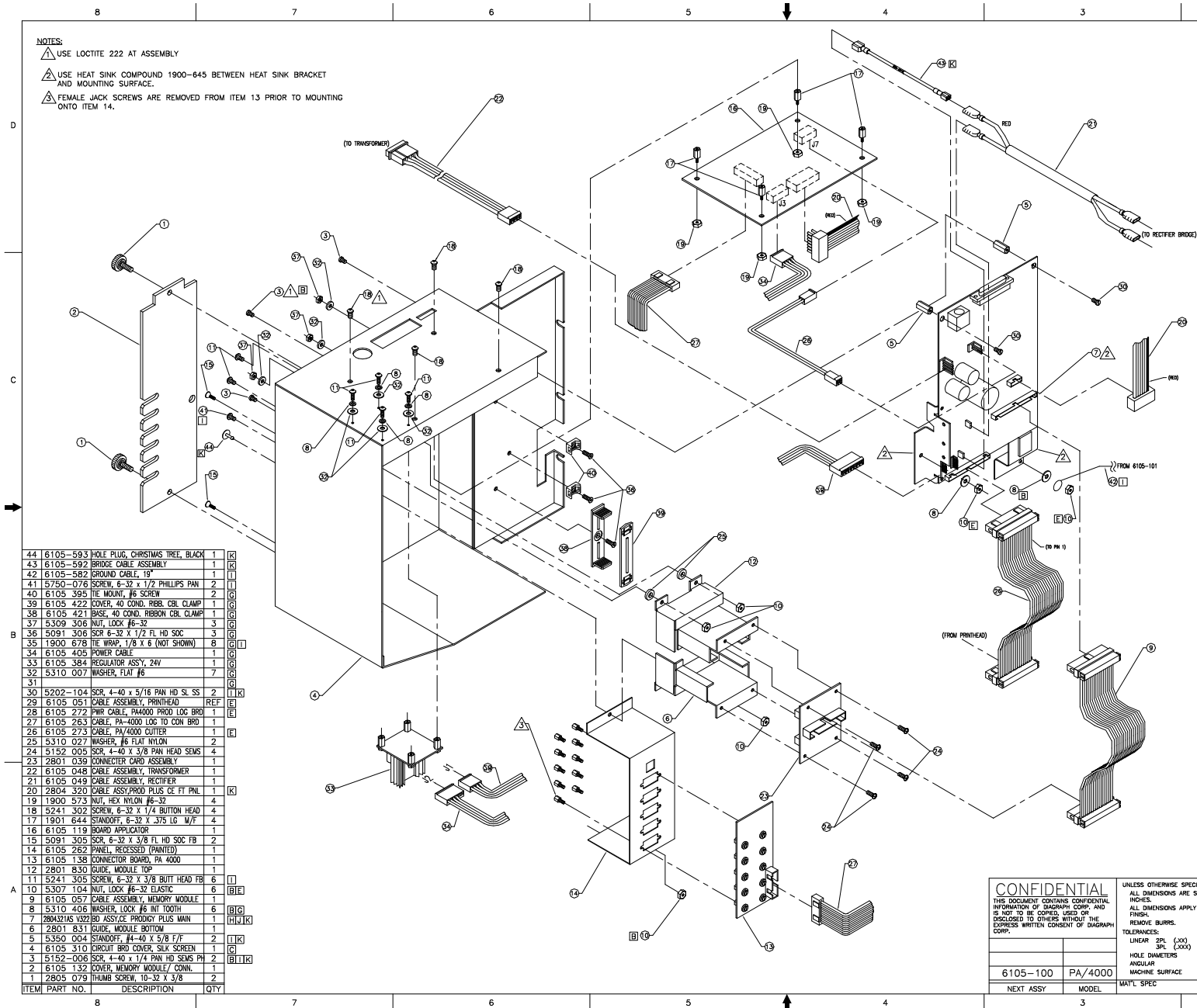


NOTES:

- 1) MA4-2 PRESET TO FULL COUNTER CLOCKWISE = 0.01 SECOND DELAY
- 2) MA4L PRESET TO FULL COUNTER CLOCKWISE = FALLING EDGE  
USE A DAB OF CORONA DOPE (1900-363) TO LOCK SETTING.
- 3) MA5 PRESET TO 1/2 TURN CLOCKWISE = 0.5 SECOND DELAY

REVISIONS					
REV	EDN	DESCRIPTION	DATE	TS	APPROVED
A	15628	NEW DRAWING	9/13/94		
B	16174	UPDATED FOR CLARIFICATION	12/18/95	SP	RJB JSC
C	17182	REMOVE 2800-422 ADD: 5700-658 QTY ITEM 29 WAS B; UPDATE NOTES AND VIEWS	11/16/98		





- NOTES:
- ▲ USE LOCTITE 222 AT ASSEMBLY
  - ▲ USE HEAT SINK COMPOUND 1900-645 BETWEEN HEAT SINK BRACKET AND MOUNTING SURFACE.
  - ▲ FEMALE JACK SCREWS ARE REMOVED FROM ITEM 13 PRIOR TO MOUNTING ONTO ITEM 14.

ITEM	PART NO.	DESCRIPTION	QTY
44	6105-593	HOLE PLUG, CHRISTMAS TREE, BLACK	1
43	6105-592	BRIDGE CABLE ASSEMBLY	1
42	6105-582	GROUND CABLE, 19'	1
41	5750-076	SCREW, 6-32 x 1/2 PHILLIPS PAN	2
40	6105-395	THE MOUNT, #6 SCREW	2
39	6105-422	COVER, 40 COND. REBEL CBL CLAMP	1
38	6105-421	BASE, 40 COND. REBEL CBL CLAMP	1
37	5309-306	NUT, LOCK #6-32	3
36	5091-306	SCR 6-32 X 1/2 FL HD SOC	3
35	1900-678	TIE WRAP, 1/8 X 6 (NOT SHOWN)	8
34	6105-405	POWER CABLE	1
33	6105-384	REGULATOR ASSY, 24V	1
32	5310-007	WASHER, FLAT #6	7
31			
30	5202-104	SCR, 4-40 x 5/16 PAN HD SL SS	2
29	6105-051	CABLE ASSEMBLY, PRINTHEAD	REF
28	6105-272	PWR CABLE, PA4000 PROD LOG BRD	1
27	6105-263	CABLE, PA-4000 LOG TO CON BRD	1
26	6105-273	CABLE, PA/4000 CUTTER	1
25	5310-027	WASHER, #6 FLAT NYLON	2
24	5152-005	SCR, 4-40 x 3/8 PAN HEAD SEMS	4
23	2801-039	CONNECTOR CARD ASSEMBLY	1
22	6105-048	CABLE ASSEMBLY, TRANSFORMER	1
21	6105-049	CABLE ASSEMBLY, RECEIVER	1
20	2804-320	CABLE ASSY PROD PLUS C/F PNL	1
19	1900-573	NUT, HEX NYLON #6-32	4
18	5241-302	SCREW, 6-32 x 1/4 BUTT HEAD	4
17	1901-644	STANDOFF, 6-32 X 3/8 LG. M/F	4
16	6105-119	BOARD APPLICATOR	1
15	5091-305	SCR, 6-32 x 3/8 FL HD SOC FB	2
14	6105-262	PANEL, RECESSED (PAINTED)	1
13	6105-138	CONNECTOR BOARD, PA 4000	1
12	2801-830	GUIDE, MODULE TOP	1
11	5241-305	SCREW, 6-32 x 3/8 BUTT HEAD FB	6
10	5307-104	NUT, LOCK #6-32 ELASTIC	6
9	6105-057	CABLE ASSEMBLY, MEMORY MODULE	1
8	5310-406	WASHER, LOCK #6 INT TOOTH	6
7	280431AS V322	BD ASSY C/F PRODOT PLUS MAIN	1
6	2801-831	GUIDE, MODULE BOTTOM	1
5	5350-004	STANDOFF, #4-40 x 5/8 F/F	2
4	6105-310	CIRCUIT BRD COVER, SILK SCREEN	1
3	5152-006	SCR, 4-40 x 1/4 PAN HD SEMS PH	2
2	6105-132	COVER, MEMORY MODULE/ CONVL	1
1	2805-079	THUMB SCREW, 10-32 X 3/8	2

REVISIONS				
REV	ECN	DESCRIPTION	DATE	APPROVED
A	15623	NEW DRAWING	10/3/94	SAD
B	15656	HARDWARE CHANGE	12/16/94	MS
C	15715	ADD SILK SCREENING	1/20/95	SAD
D	15676	STRUCTURE UPDATE	2/7/95	SAD
E	15782	STRUCTURE UPDATE	2/28/95	SAD
F	16016	DWG CORRECTIONS, ADD ITEM 30 & NOTE#3	7/1/95	SAD
	16114	UPDATE TO VERSION 2.0 FIRMWARE		
	16085	Q1 CORRECTION		
	16150	UPDATE HAND-HELD FIRMWARE TO VER 1.01		
	15973	ADD 2-PIN CONNECTOR TO 2801-027		
G	16108	ADDITION OF 24 VOLT REGULATOR	8/1/95	RJB LH
	18268	6105-119 & 6105-138 CHANGE	8/1/95	
	18276	ADD TIE WRAP MOUNTS	8/31/95	
H	16798	FIRMWARE IN 2801-027AS WAS VER. 3.04	2/3/97	RJB SP
	16812	6105-310 MODIFIED FOR REV.P PROD PL BRD.	2/3/97	
I	17203	ADD HARDWARE FOR GROUNDING ADD ITEMS 41 & 42, ITEM 35 QTY. WAS 6 ITEM 30 P/N WAS 5201-103 NOW 5202-104 ITEM 11 QTY. WAS 8 ITEM 3 WAS 5241-103 NOW 5152-006 ITEM 3 QTY. WAS 4 NOW 3 ITEM 5 QTY. WAS 4 NOW 3 ITEM 30 QTY. WAS 4 NOW 3 SEE ITEM 3 FROM 17203 SEE THE EXISTING ITEM 4 FROM THE EXISTING ITEM 4 ITEM 30 WAS ON THE LOWER LEFT CORNER OF THE PRODUCT PLACE THE ITEM 3, THERE IS A CHANGING THE POSITION THE BACK FOR THIS ASSEMBLY.	3/4/98	RJB
J	17113	ITEM 7 WAS 2801027AS V315	12/4/97	RJB
K	17548	REMOVE: 6105-058, 2801-027ASV322; ADD: 6105-592,6105-593,2804-320, 2804-321ASV322;QTY ITEMS 3, 5, 30 WAS 3	12/3/98	

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ALL DIMENSIONS APPLY AFTER FINISH.  
REMOVE BURRS.

TOLERANCES:  
LINEAR .2PL (.XXX) ±.015  
3PL (.XXX) ±.005  
HOLE DIAMETERS ±.005  
ANGULAR ±1°  
MACHINE SURFACE 125/

MAT'L SPEC

FILE NAME 6105-150.DWG

DWN S. DEUEL 10/3/94

APP L. HAMMEL 10/3/94

APP R. BELANGER 10/3/95

ASSY PROC

INSP PROC

CAGE CODE

**Diagraph CORPORATION**

ELECTRICAL BOX ASS'Y, PA/4000

SIZE D

SCALE: N/A

REV K

SHEET 1 OF 1

6105-100

PA/4000

MODEL

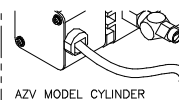
3

2

1

DWG NO 6105-150 SH 1

DOVE TAIL STOP IS PROPERLY SET SO THAT WHEN THE TAMP PAD ASSEMBLY IS SLID UP AGAINST THE STOP IT WILL: 1) RELIABLY SECURE THE LABEL AS IT IS DISPENSED. 2) COMPLETELY CLEAR THE PEEL BLADE WHEN TAMP CYLINDER IS ACTIVATED.



AZV MODEL CYLINDER



SIZE: DWG NO. 6105-180/181/182 M  
SCALE: NONE SHEET 2 OF 2

REV 1

# NOTES:

△ THE 1/4" ID TUBING (ITEM 24) IS ONLY ADDED TO THE 12 AND 18 INCH CYLINDER ASSEMBLIES. THIS REPLACES THE TUBING SUPPLIED WITH THE AIR CONTROL BOX.

△ A COPY OF THE UNPACKING INSTRUCTIONS, P/N 6105180-PL\*, IS TO BE INCLUDED WITH EACH ASSY. COPIES OF THIS DOCUMENT ARE TO BE KEPT ON HAND BY MFG. THIS SET OF INSTRUCTIONS IS A CONTROL DOCUMENT. IF ANY ADDITIONAL COPIES ARE NEEDED, CONTACT THE ENGINEERING DOCUMENT CONTROL GROUP FOR MASTER COPY.

△ USE THE PERFORMANCE SERIES LABEL FORMAT, 6105BOXL-FMT\*, TO PRINT THE LABELS FOR THE OUTER CARTON(S). WHEN PROMPTED ENTER REVISION LEVEL OF THE PART OR ASSY! LABEL STOCK: P/N 3940-566 \* 6105180-PL, 6105BOXL-FMT, AND 6105BOXL-DBF ARE CONTROLLED DOCUMENTS. DO NOT MODIFY WITHOUT ENGINEERING APPROVAL. RIBBON: P/N 2900-098 OR 2900-099

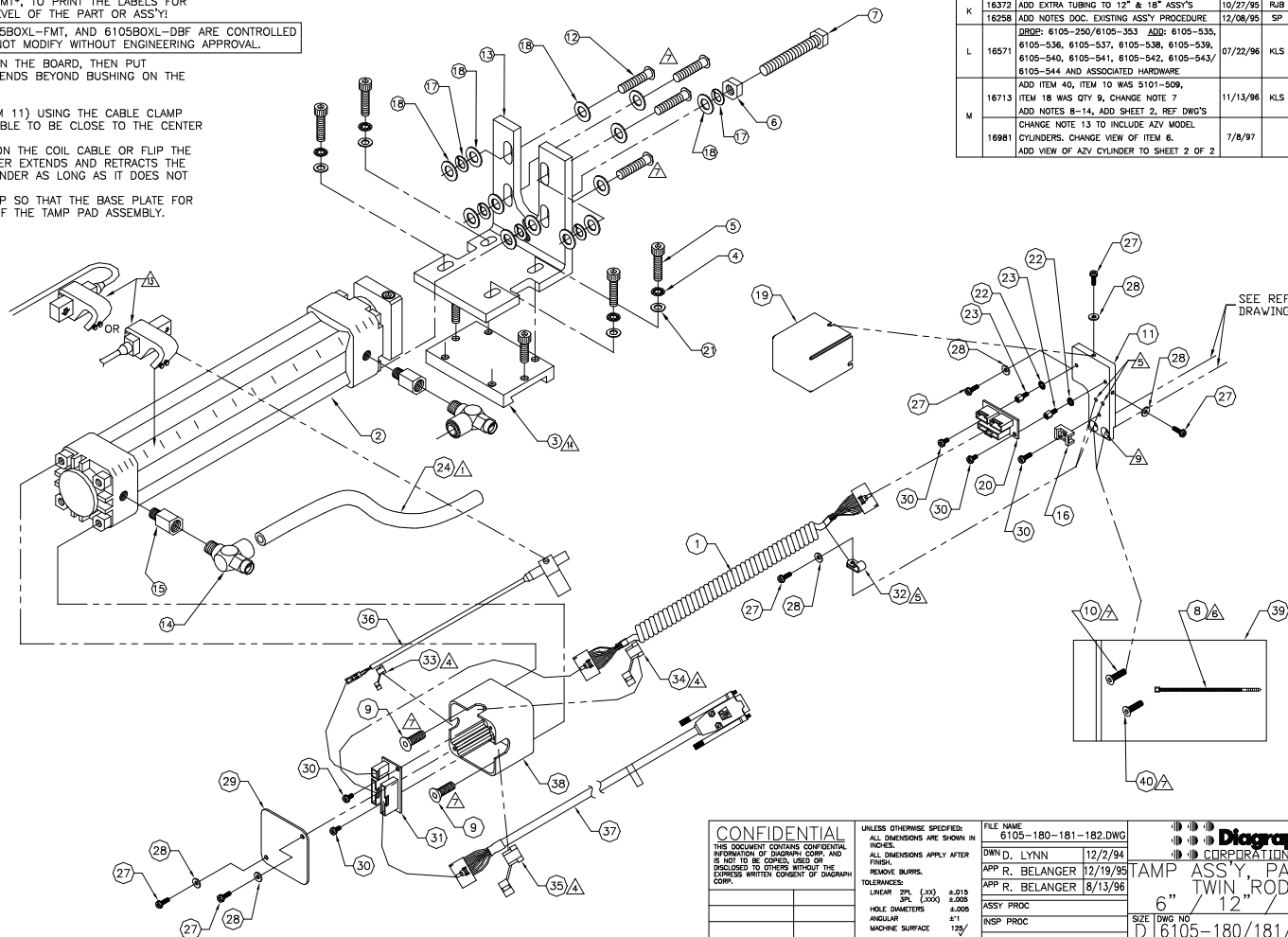
△ AFTER BOARD IS IN PLACE, PLUG CABLE INTO CONNECTOR ON THE BOARD, THEN PUT BUSHING ONTO CABLE SUCH THAT 1/4" OF THE JACKET EXTENDS BEYOND BUSHING ON THE INSIDE, THEN PUSH BUSHING INTO PLACE.

△ WHEN SECURING THE CABLE (ITEM 1) TO THE BRACKET (ITEM 11) USING THE CABLE CLAMP (ITEM 32). USE THE TAPPED HOLE THAT WILL ALLOW THE CABLE TO BE CLOSE TO THE CENTER OF THE BRACKET. IF NECESSARY MOVE THE "C" CLIP (ITEM 32) FURTHER UP ON THE COIL CABLE OR FLIP THE CABLE ASSEMBLY AND USE THE OTHER END. AS THE CYLINDER EXTENDS AND RETRACTS THE COILED CABLE CAN RUB AGAINST THE BRACKET OR THE CYLINDER AS LONG AS IT DOES NOT GET HUNG UP ON THE BRACKET OR ANY OTHER PARTS. PLEASE NOTE THAT SOME TAMP PAD ASSEMBLIES ARE SET UP SO THAT THE BASE PLATE FOR THE TAMP PAD SENSOR IS MOUNTED TOWARDS THE FRONT OF THE TAMP PAD ASSEMBLY.

TOP ASSY PART #	DESCRIPTION	LG.	CABLE	CYLINDER	TUBING
6105-180	TAMP ASSEMBLY, PA4000 6" TWIN ROD	6"	6105-543	6105-091	0"
6105-181	TAMP ASSEMBLY, PA4000 12" TWIN ROD	12"	6105-544	6105-092	24"
6105-182	TAMP ASSEMBLY, PA4000 18" TWIN ROD	18"	6105-544	6105-093	30"


REVISIONS					
REV	EDN	DESCRIPTION	DATE	APPROVED	
A	15635	NEW DRAWING	12/02/94	DL	
B	15650	DROP: 6105-176, 2805-277	12/20/94	DL	
C	15687	MAPICS UPDATE	02/09/95	DL	
D	15739	WAS: 5072-015, 6105-174	02/09/95	DL	
E	15773	ADD: 5310-011, 5310-305	02/20/95	DL	
F	15791	ADD: 6105-353 TO 181 & 182	03/03/95	SAD	
G	15818	WAS: 5310-011, 5081-516	03/17/95	DL	
H	15914	ADD: CABLE TIE MOUNT	04/21/95	RG	
I	16116	WAS: 9 FLAT WASHER, ITEM #18	07/10/95	RJB	
J	16266	ADD CARTON & PACKING MATERIALS	10/27/95	RJB	
K	16372	ADD EXTRA TUBING TO 12" & 18" ASSY'S	10/27/95	RJB	
	16258	ADD NOTES DOC. EXISTING ASSY PROCEDURE	12/08/95	SP	RJB
L	16571	DRQ: 6105-250/6105-353 ADD: 6105-535, 6105-536, 6105-537, 6105-538, 6105-539, 6105-540, 6105-541, 6105-542, 6105-543/ 6105-544 AND ASSOCIATED HARDWARE	07/22/96	KLS	RJB SP
M	16713	ADD ITEM 40, ITEM 10 WAS 5101-509, ITEM 18 WAS QTY 9, CHANGE NOTE 7	11/13/96	KLS	RJB SP
	16981	ADD NOTES 8-14, ADD SHEET 2, REF DWG'S CHANGE NOTE 13 TO INCLUDE AZV MODEL CYLINDERS. CHANGE VIEW OF ITEM 6. ADD VIEW OF AZV CYLINDER TO SHEET 2 OF 2	7/8/97		

40	5091-511	SCR, 8-32 X 3/8 FL HD SOC SS	1	Q
39	8921-030	BAG, 4" ZIPLOC	1	Q
38	6105-539	BASE PLATE, TOP OF CYLINDER	1	Q
37	6105-536	CABLE ASSY, CHASSIS TO TOP OF CYL	1	Q
36	6105-535	CABLE ASSEMBLY, CYLINDER SWITCH	1	Q
35	6105-547	BUSHING, 3/25 TO STRAIN RELIEF	1	Q
34	6105-546	BUSHING, 7/25 TO STRAIN RELIEF	1	Q
33	6105-545	BUSHING, 1/25 TO STRAIN RELIEF	1	Q
32	5700-662	CABLE CLAMP, 1/8" DIA.	1	Q
31	6105-537	CIRCUIT BOARD, TOP OF CYLINDER	1	Q
30	5152-006	SCR, 4-40 X 1/4 PAN HD SEMS PH	5	Q
29	6105-541	COVER, TOP OF CYLINDER	1	Q
28	5310-028	WASHER, #4 FLAT ZINC	6	Q
27	5152-005	SCR, 4-40 X 3/8 PAN HD SEMS PH	6	Q
26	6105-351	CUSHION, PKG TAMP CYL ASSY	1	Q
25	6105-347	CARTON, TAMP	1	Q
24	1301-875	TUBING, 1/4 ID X 3/8 OD	REF	Q
23	5700-417	STANDOFF, 3/8 LG X 4-40 THD	2	Q
22	5310-404	WASHER, LOCK #4 INT TOOTH	2	Q
21	5310-009	WASHER, FLAT #10	4	Q
20	6105-538	CIRCUIT BOARD ON TAMP PAD	1	Q
19	6105-542	COVER FOR ASSEMBLY ON TAMP PAD	1	Q
18	5310-031	WASHER 1/4 ID, STAINLESS STEEL	13	Q
17	5310-305	WASHER, LOCK 1/4 ID	5	Q
16	6105-423	TIE MOUNT #4 SCREW	1	Q
15	6105-298	REDUCER, 1/4 FEMALE X 1/8" MALE	2	Q
14	6105-297	FLOW CONTROL, 1/4" X 3/8" OD TUBING	2	Q
13	6105-086	BRACKET, TAMP CYLINDER	1	Q
12	5242-011	SCR, 1/4-20 X .75" LG BT HD SOC CAP	4	Q
11	6105-540	BASE PLATE ON TAMP PAD	1	Q
10	5091-512	SCR, 8-32 X 5/8 FL HD SOC SS	1	Q
9	5092-010	SCR, 1/4-20 X .75" LG FL HD SOC	2	Q
8	1900-372	TIE WRAP, PANDUIT .09" X 3"	7	Q
7	5073-520	SCR, 1/4-20 X 1.75" LG HEX HD CAP	1	Q
6	5305-010	INUT, 1/4-20 HEX JAM	1	Q
5	5081-710	SCR, #10-32 X .75" LG, SOC, HD, CAP	6	Q
4	5310-409	LOCK WASHER, #10 INTERNAL TOOTH	4	Q
3	6105-087	DOVETAIL, FEMALE	1	Q
2	6105-093	TAMP CYLINDER, 18" TWIN ROD	REF	Q
	6105-092	TAMP CYLINDER, 12" TWIN ROD	REF	Q
	6105-091	TAMP CYLINDER, 6" TWIN ROD	REF	Q
	6105-544	CABLE ASSY, EXT LTH COILED CYL	REF	Q
1	6105-543	CABLE ASSY, STD LTH COILED CYL	REF	Q
ITEM	PART NO.	DESCRIPTION	QTY	

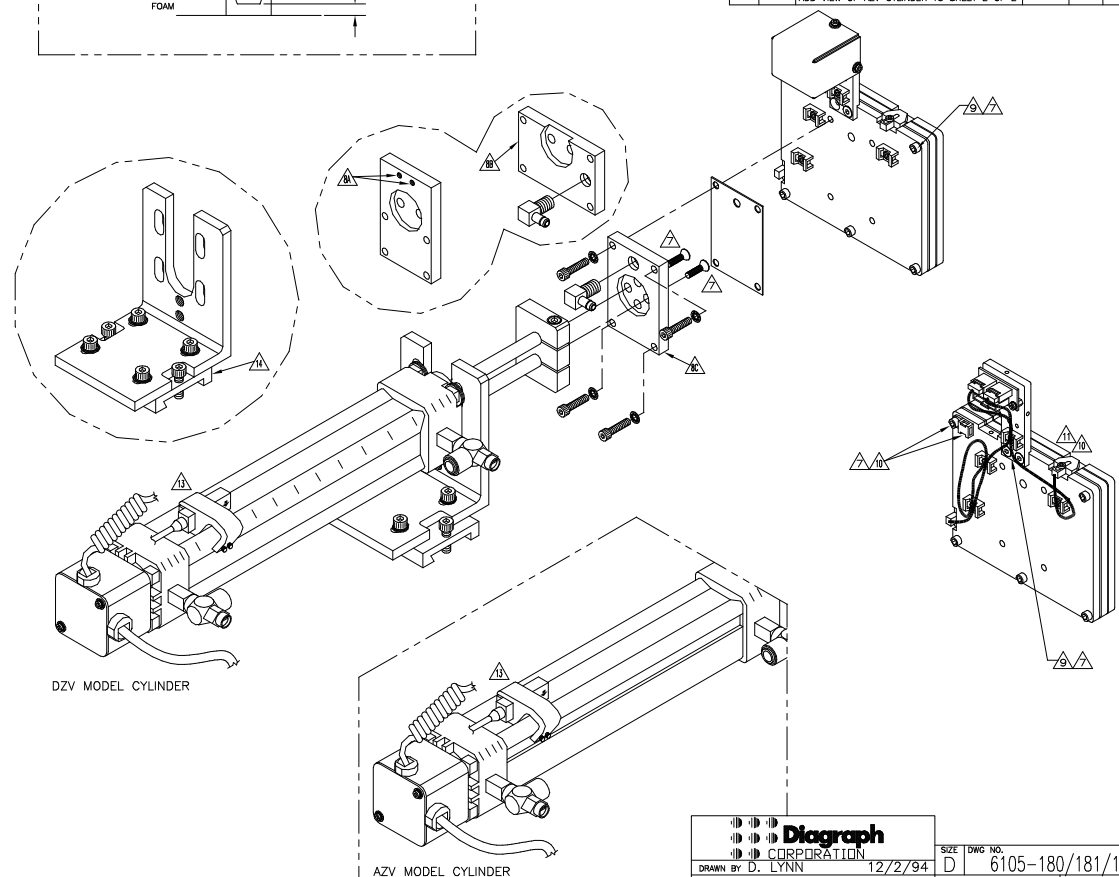
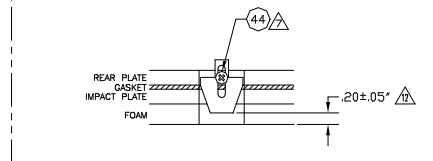


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ALL DIMENSIONS APPLY AFTER FINISH.  
REMOVE BURRS.  
TOLERANCES:  
LINEAR .010 (1/16) .015 (1/8) .020 (1/4) .030 (1/2) .050 (1) .100 (2) .200 (4) .500 (8) 1.000 (16) 2.000 (32) 4.000 (64) 8.000 (128) 16.000 (256) 32.000 (512) 64.000 (1024) 128.000 (2048) 256.000 (4096) 512.000 (8192) 1024.000 (16384) 2048.000 (32768) 4096.000 (65536) 8192.000 (131072) 16384.000 (262144) 32768.000 (524288) 65536.000 (1048576) 131072.000 (2097152) 262144.000 (4194304) 524288.000 (8388608) 1048576.000 (16777216) 2097152.000 (33554432) 4194304.000 (67108864) 8388608.000 (134217728) 16777216.000 (268435456) 33554432.000 (536870912) 67108864.000 (1073741824) 134217728.000 (2147483648) 268435456.000 (4294967296) 536870912.000 (8589934592) 1073741824.000 (17179869184) 2147483648.000 (34359738368) 4294967296.000 (68719476736) 8589934592.000 (137438953472) 17179869184.000 (274877906944) 34359738368.000 (549755813888) 68719476736.000 (1099511627776) 137438953472.000 (2199023255552) 274877906944.000 (4398046511104) 549755813888.000 (8796093022208) 1099511627776.000 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 <b>Diagraph</b> CORPORATION		SIZE <b>D</b>	DWG NO. <b>6105-180/181/182</b>	REV <b>M</b>
DRAWN BY <b>D. LYNN</b>		<b>12/2/94</b>		
		SCALE: <b>NONE</b>	SHEET <b>2</b> OF <b>2</b>	

#### POSITION OF LABEL PRESENT AND AUTO RETRACT SENSORS



WHEN THE TAMP CYLINDER ASSEMBLY IS MOUNTED ONTO THE PA/4000 BE SURE THAT THE DOVE TAIL STOP IS PROPERLY SET SO THAT WHEN THE TAMP PAD ASSEMBLY IS SLID UP AGAINST THE STOP IT WILL: 1) RELIABLY SECURE THE LABEL AS IT IS DISPENSED. 2) COMPLETELY CLEAR THE PEEL BLADE WHEN TAMP CYLINDER IS ACTIVATED.

TOP ASSY PART #	DESCRIPTION	I.G.	CABLE	CYLINDER	TUBING
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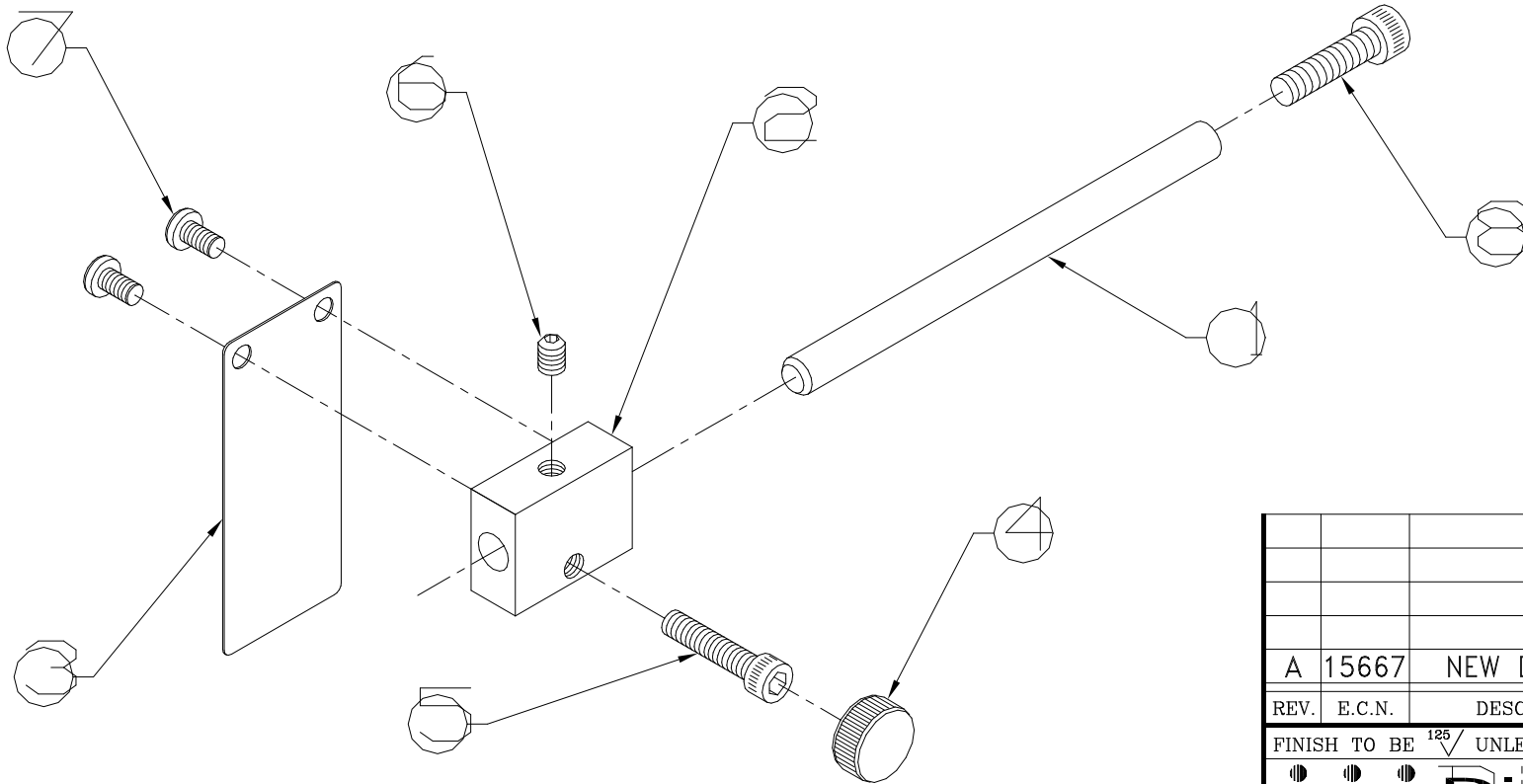
		REVISIONS				
REV	ECN	DESCRIPTION	DATE	APPROVED		
A	15635	NEW DRAWING	12/02/94	DL		
B	15659	DROP: 6105-176, 2805-277	12/20/94	DL		

NOTES:

3

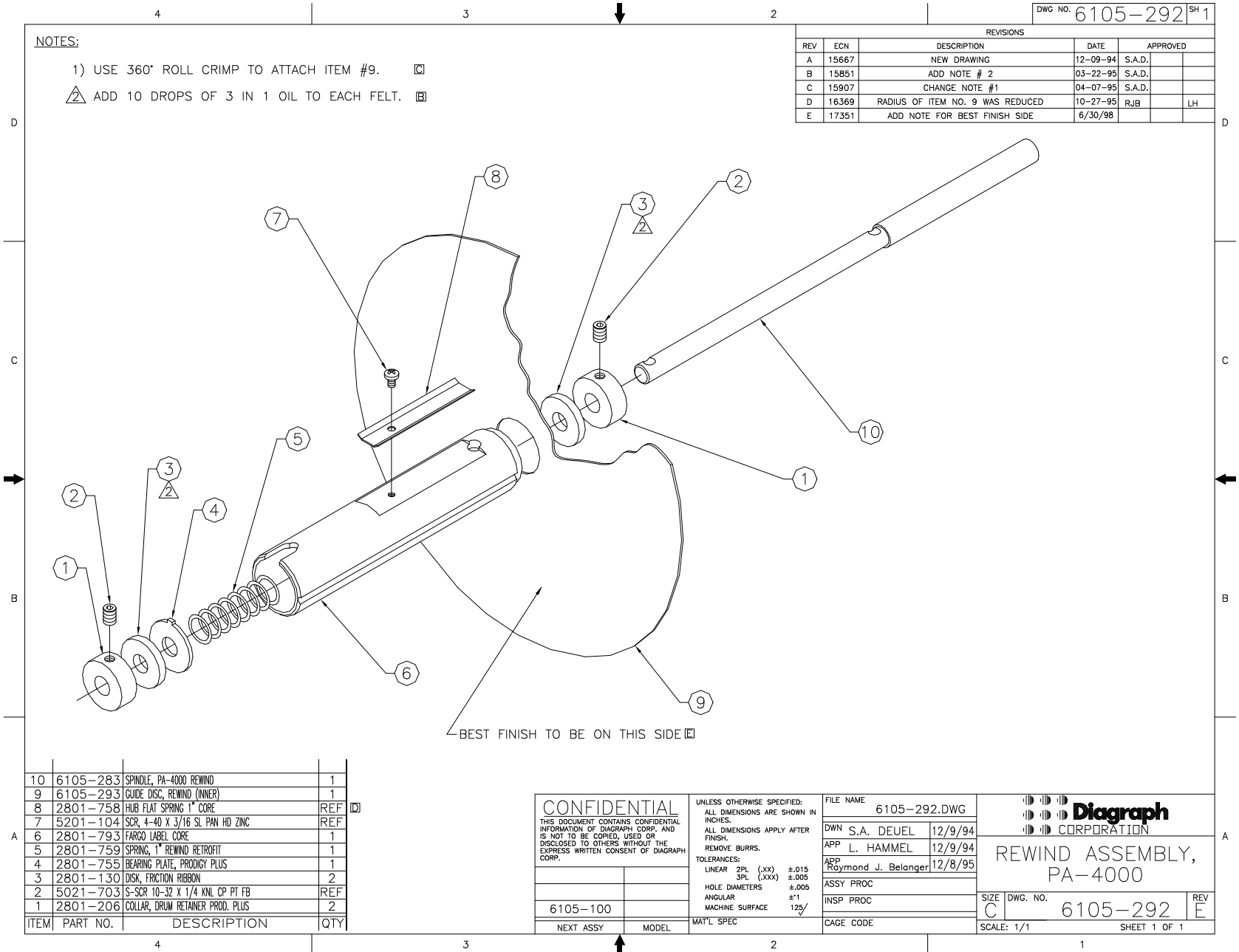
B No. 6105-290

X-REF.



8	5081-710	SCR, 10-32 X 3/4 SOC HD	1
7	5152-001	SCR, 6-32 X 1/4 PAN HD SEMS PH	2
6	5021-502	SET SCREW, 8-32 X 3/16 KNL CP PT	1
5	5081-513	SCREW, 8-32 X 3/4 SOC HD STNLS	1
4	6105-286	THUMB SCREW KNOB	1
3	6105-289	TENSION PLATE	1
2	6105-288	TENSION BLOCK	1
1	6105-287	SHAFT, TENSION	1
ITEM	PART NO.	DESCRIPTION	QTY

A	15667	NEW DRAWING	12/08/94	S.A.D.
REV.	E.C.N.	DESCRIPTION	DATE	BY
FINISH TO BE <sup>125</sup> √ UNLESS OTHERWISE SPECIFIED				
●	●	●	Diagraph	
●	●	●	CORPORATION	
●	●			
TITLE: TENSION ASSEMBLY, PA-4000				
DWG. TOLERANCES UNLESS OTHERWISE SPECIFIED				
.XX= ± .015		<u>DO NOT SCALE DWG.</u>		
.XXX= ± .005		<u>REMOVE BURRS</u>		
ANGULAR = ± 1°				
DR. Scott A. Deuel		DATE: 12/08/94		CK. L.H.
MAT'L SPEC.				
SCALE: N\A		NEXT ASS'Y:		
File Name: 6105-290.DWG				
DWG. No. 6105-290				



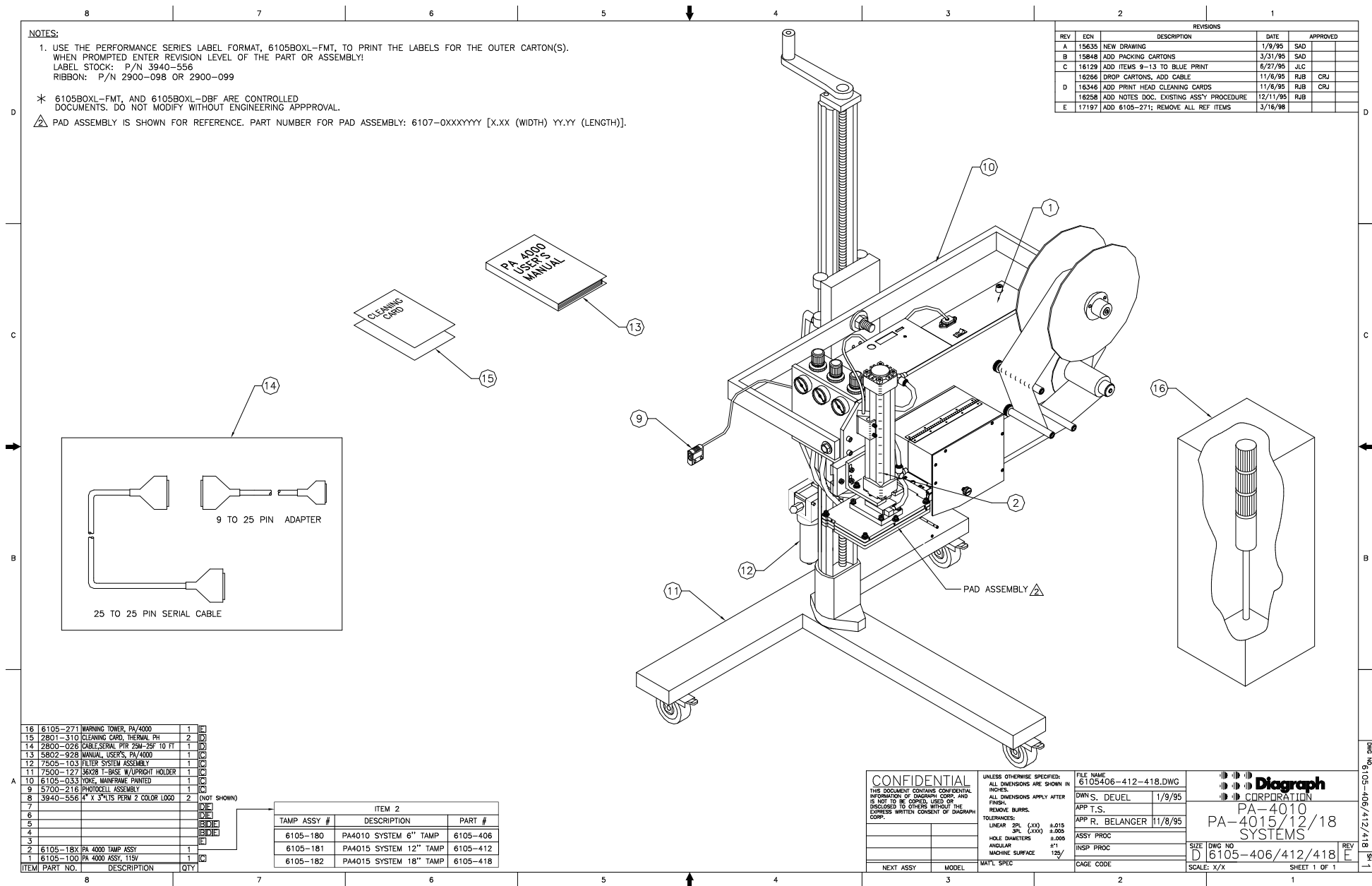
NOTES:

1. USE THE PERFORMANCE SERIES LABEL FORMAT, 6105BOXL-FMT, TO PRINT THE LABELS FOR THE OUTER CARTON(S).  
WHEN PROMPTED ENTER REVISION LEVEL OF THE PART OR ASSEMBLY!  
LABEL STOCK: P/N 3940-556  
RIBBON: P/N 2900-098 OR 2900-099

\* 6105BOXL-FMT, AND 6105BOXL-DBF ARE CONTROLLED DOCUMENTS. DO NOT MODIFY WITHOUT ENGINEERING APPROVAL.

△ PAD ASSEMBLY IS SHOWN FOR REFERENCE. PART NUMBER FOR PAD ASSEMBLY: 6107-0XXXXXX [X.XX (WIDTH) YY.YY (LENGTH)].

REVISIONS					
REV	ECN	DESCRIPTION	DATE	APPROVED	
A	15635	NEW DRAWING	1/9/95	SAD	
B	15848	ADD PACKING CARTONS	3/31/95	SAD	
C	16129	ADD ITEMS 9-13 TO BLUE PRINT	6/27/95	JLC	
D	16266	DROP CARTONS, ADD CABLE	11/6/95	RJB	CRJ
	16346	ADD PRINT HEAD CLEANING CARDS	11/6/95	RJB	CRJ
	16258	ADD NOTES DOC. EXISTING ASSY PROCEDURE	12/11/95	RJB	
	17197	ADD 6105-271; REMOVE ALL REF ITEMS	3/16/98		



16	6105-271	WARNING TOWER, PA/4000	1	C
15	2801-310	CLEANING CARD, THERMAL PH	2	D
14	2800-026	CABLE, SERIAL PTP 25M-25F 10 FT	1	D
13	5802-928	MANUAL, USER'S, PA/4000	1	C
12	7505-103	FILTER SYSTEM ASSEMBLY	1	C
11	7500-127	BOX28 T-BASE W/UPRIGHT HOLDER	1	C
10	6105-053	YOKE, MAINFRAME PAINTED	1	C
9	5700-216	PHOTOCELL ASSEMBLY	1	C
8	3940-556	4" X 3" LITS PERM 2 COLOR LOGO	2	(NOT SHOWN)
7				D
6				D
5				D
4				D
3				D
2	6105-18X	PA 4000 TAMP ASSY	1	C
1	6105-100	PA 4000 ASSY, 115V	1	C
ITEM	PART NO.	DESCRIPTION	QTY	

ITEM 2		
TAMP ASSY #	DESCRIPTION	PART #
6105-180	PA4010 SYSTEM 6" TAMP	6105-406
6105-181	PA4015 SYSTEM 12" TAMP	6105-412
6105-182	PA4015 SYSTEM 18" TAMP	6105-418

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ALL DIMENSIONS APPLY AFTER FINISH.  
REMOVE BURRS.  
TOLERANCES:  
LINEAR .2PL (.XXX) ±.015  
HOLE DIAMETERS .3PL (.XXX) ±.005  
ANGULAR .5°  
MACHINE SURFACE 125/

FILE NAME  
6105406-412-418.DWG  
DWN S. DEUEL 1/9/95  
APP T.S.  
APP R. BELANGER 11/8/95  
ASSY PROC  
INSP PROC  
CAGE CODE

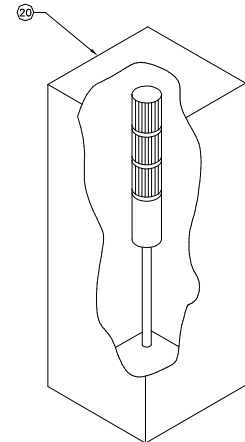
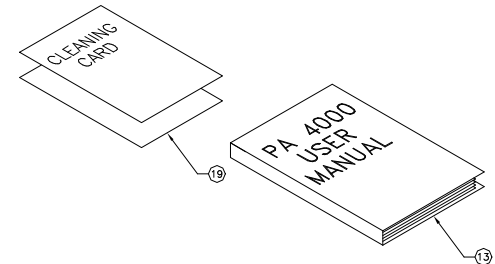
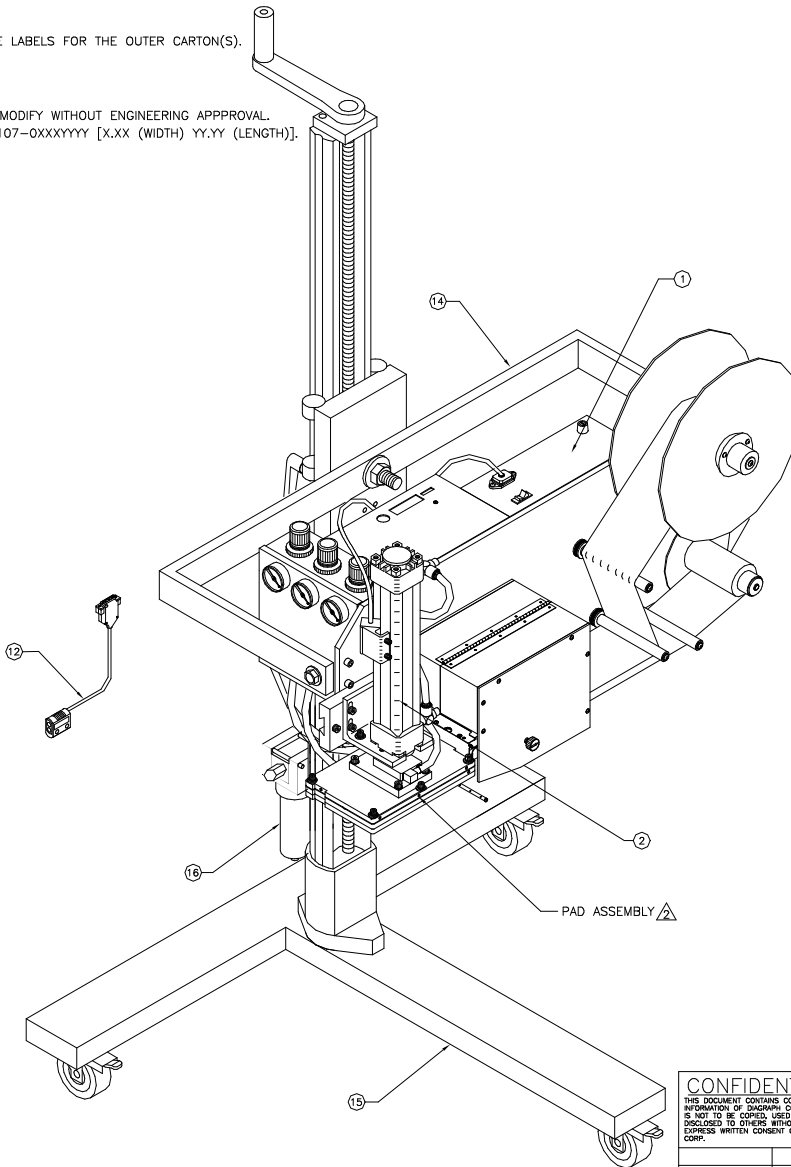
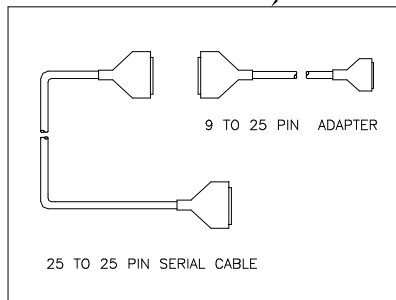
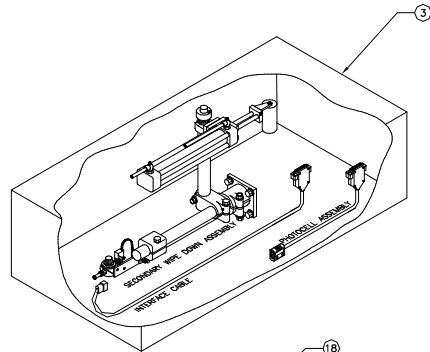
**Diagraph CORPORATION**  
PA-4010  
PA-4015/12/18  
SYSTEMS  
SIZE DWG NO  
D 6105-406/412/418  
SCALE: X/X  
SHEET 1 OF 1  
REV E

NOTES:

1. USE THE PERFORMANCE SERIES LABEL FORMAT, 6105BOXL-FMT, TO PRINT THE LABELS FOR THE OUTER CARTON(S). WHEN PROMPTED ENTER REVISION LEVEL OF THE PART OR ASSEMBLY!  
LABEL STOCK: P/N 3940-556  
RIBBON: P/N 2900-098 OR 2900-099

- \* 6105BOXL-FMT, AND 6105BOXL-DBF ARE CONTROLLED DOCUMENTS. DO NOT MODIFY WITHOUT ENGINEERING APPROVAL.  
△ PAD ASSEMBLY SHOWN FOR REFERENCE. PART NUMBER FOR PAD ASSEMBLY: 6107-0XXXXXX [X.XX (WIDTH) YY.YY (LENGTH)].

REVISIONS				
REV	ECN	DESCRIPTION	DATE	APPROVED
A	15635	NEW DRAWING	12/22/94	SAD
B	15848	ADD PACKING CARTONS	3/31/95	SAD
C	15993	ADD:6105-143,-153,-105, 5700-216	5/19/95	SAD
D	16128	ADD ITEMS 3, 10-17 TO BLUEPRINT	6/27/95	JLC
E	16174	DROP ITEMS 10 & 11	11/7/95	RJB
F	16266	DROP CARTONS, ADD CABLE	11/7/95	RJB
	16346	ADD PRINT HEAD CLEANING CARDS	11/7/95	RJB
	16258	ADD NOTES DOC. EXISTING ASSY PROCEDURE	12/11/95	RJB SP
G	17197	ADD:6105-271; REMOVE ALL REFERENCE ITEMS	4/16/98	



20	6105-271	WARNING TOWER, PA/4000	1	Q
19	2801-310	CLEANING CARD, THERMAL, PA	2	Q
18	2800-026	CABLE, SERIAL PTR 25A-25F 10 FT	1	Q
17				Q
16	7505-103	FILTER SYSTEM ASSEMBLY	1	Q
15	7500-127	SOCKET-BASE W/UPRIGHT HOLDER	1	Q
14	6105-033	YONGE MAINFRAME PAINTED	1	Q
13	5802-928	MANUAL, USER'S, PA/4000	1	Q
12	5700-216	PHOTOCELL ASSEMBLY	1	Q
11				Q
10				Q
9	3940-556	4" X 3" LITS PERM 2 COLOR LOGO	2	Q (NOT SHOWN)
8				Q
7				Q
6				Q
5				Q
4				Q
3	6105-103	SECONDARY WIPE DOWN ASSEMBLY	1	Q
2	6105-180	TAMP ASSY, PA 4000 TWIN ROD/6"	1	Q
1	6105-100	PA/4000 ASSY, 115V	1	Q
ITEM PART NO. DESCRIPTION QTY				

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UNLESS OTHERWISE SPECIFIED:  
ALL DIMENSIONS ARE SHOWN IN INCHES.  
ALL DIMENSIONS APPLY AFTER FINISH.  
REMOVE BURRS.  
TOLERANCES:  
LINEAR .25L (.XX) ±.015  
3PL (.XXX) ±.005  
HOLE DIAMETERS ±.005  
ANGULAR ±1  
MACHINE SURFACE 125/√

FILE NAME 6105-506.DWG  
DWNS, DEUEL 12/22/94  
APP T. S.  
APP R. BELANGER 12/19/95  
ASSY PROC  
INSP PROC  
CAGE CODE

**Diagraph CORPORATION**

PA-4020 SYSTEMS

SIZE DWG NO 6105-506 G  
SCALE: NONE SHEET 1 OF 1

6105-506 1



